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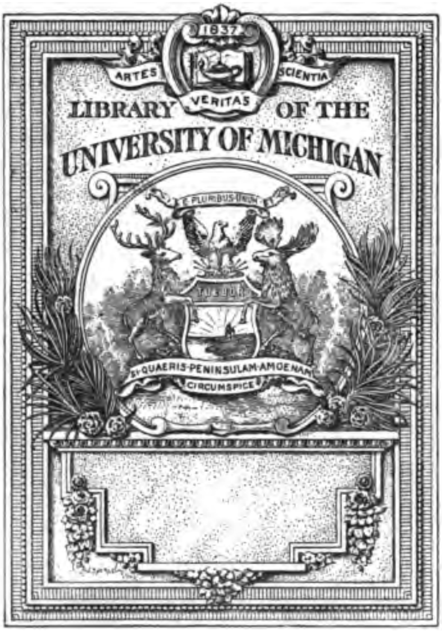
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CHAS. W. FARR, *President*, 1907,

Thirteenth Annual Report

OF THE

Illinois Farmers' Institute

WITH REPORT OF

County Farmers' Institutes

FOR THE

Year Ending June 30, 1908.

SPRINGFIELD, ILL.
Phillips Bros., State Printers
1908.

GOV. CHARLES S. DENEEN.

LETTER OF TRANSMITTAL.

To His Excellency, Charles S. Deneen, Governor of Illinois:

DEAR SIR—I have the honor to transmit herewith the thirteenth annual report of the Illinois Farmers' Institute for the fiscal year ending June 30, 1908.

Respectfully submitted,

FRANK H. HALL,
Superintendent and Editor.

H. A. MCKEENE,
Secretary.

200379

J. P. MASON, *President.*

A. N. ABBOTT, *Vice President.*

FRANK H. HALL, *Superintendent.*

H. A. McKEENE, *Secretary.*

A. P. GROUT, *Treasurer.*

FRANK I. MANN, *Auditor.*

FARMERS' INSTITUTE OFFICERS FOR 1908-9.

President—J. P. MASON	Elgin
Vice President—A. N. ABBOTT	Morrison
Superintendent—FRANK H. HALL	Aurora
Treasurer—A. P. GROUT	Winchester
Secretary—H. A. McKEENE	Springfield
Auditor—FRANK I. MANN	Gilman

BOARD OF DIRECTORS.

EX OFFICIO.

Superintendent of Public Instruction—F. G. Blair, Springfield.
Dean of the College of Agriculture—Eugene Davenport, Urbana.
President State Board of Agriculture—Geo. H. Madden, Mendota.
President State Horticultural Society—R. O. Graham, Bloomington.
President State Dairymen's Association—L. N. Wiggins, Springfield.

ELECTIVE BY CONGRESSIONAL DISTRICTS.

1st Dist.—C. P. Reynolds, 120 S. Clinton street, Chicago.
2nd Dist.—James Frake, Suite 28, 88 LaSalle street, Chicago.
3rd Dist.—Merrill K. Sweet, Glenwood.
4th Dist.—B. R. Pierce, 562 45th street, Chicago.
5th Dist.—John M. Houseman, 919 Millard avenue, Chicago.
7th Dist.—Chas. W. Farr, 2397 N. 42d court, Chicago.
8th Dist.—John M. Clark, 143 W. Randolph street, Chicago.
9th Dist.—J. F. Rehm, 1768 Deming court, Chicago.
10th Dist.—Ralph W. Chittenden, Gurnee.
11th Dist.—J. P. Mason, Elgin.
12th Dist.—B. F. Wyman, Sycamore.
13th Dist.—A. N. Abbott, Morrison.
14th Dist.—A. W. Miner, Adair.
15th Dist.—S. N. Black, Clayton.
16th Dist.—Ralph Allen, Delavan.
17th Dist.—S. B. Mason, Bloomington.
18th Dist.—Frank I. Mann, Gilman.
19th Dist.—J. B. Burrows. Decatur.
20th Dist.—A. P. Grout, Winchester.
21st Dist.—Edward Grimes, Raymond.
22nd Dist.—E. W. Burroughs, Edwardsville.
23rd Dist.—A. V. Schermerhorn, Kinmundy.
24th Dist.—J. F. McCartney, Metropolis.
25th Dist.—W. E. Braden, Cutler.

STANDING COMMITTEES.

EXECUTIVE.

J. P. Mason.
E. W. Burroughs.
B. F. Wyman.
Edward Grimes.
A. V. Schermerhorn.

HIGHWAY.

E. W. Burroughs.
R. W. Chittenden.
S. B. Mason.
J. P. Mason.
L. N. Wiggins.

ENTOMOLOGY.

Frank I. Mann.
R. O. Graham.

LEGISLATIVE.

A. N. Abbott.
C. P. Reynolds.
A. P. Grout.
J. P. Mason.
Ralph Allen.

DOMESTIC SCIENCE.

J. B. Burrows.
James Frake.
S. B. Mason.
J. P. Mason.
A. V. Schermerhorn.

WAYS AND MEANS OF IMPROVING COUNTY FARMERS' INSTITUTES.

A. P. Grout.
S. N. Black.
Eugene Davenport.
J. P. Mason.
A. W. Miner.

AGRICULTURAL EDUCATION IN THE PUBLIC SCHOOLS.

F. G. Blair.
J. F. McCartney.
Merrill K. Sweet.
J. P. Mason.
Chas. W. Farr.

SOIL INVESTIGATIONS AND EXPERIMENTS.

Ralph Allen.
W. E. Braden.
A. N. Abbott.
J. P. Mason.
Frank I. Mann.

AN ACT CREATING THE ILLINOIS FARMERS' INSTITUTE.

Approved June 24, 1895. Amended and approved May 11, 1901. Amended and approved May 15, 1903.

SECTION 1. *Be it enacted by the People of the State of Illinois, represented in the General Assembly:* That to assist and encourage useful education among the farmers, and for developing the agricultural resources of the State, that an organization under the name and style of "Illinois Farmers' Institute" is hereby created, and declared a public corporation of the State.

§ 2. It shall consist of three delegates from each county of the State, elected annually at the farmers' institutes for said county by the members thereof.

§ 3. The affairs of the Illinois Farmers' Institute shall be managed by a board of directors, consisting of:

1. State Superintendent of Public Instruction.
2. Professor of Agriculture of the State of Illinois.
3. President of the State Board of Agriculture.
4. President of the State Horticultural Society.
5. President of the State Dairymen's Association, and one member from each congressional district of the State, to be selected by the delegates from the district present at the annual meeting of this organization: *Provided,* that the members first selected from the congressional districts of even numbers shall serve for one year, and the members first selected from the congressional districts of odd numbers shall serve for two years, and that the members selected thereafter to fill the expired terms of office shall serve for the period of two years.

§ 4. The board of directors of the Illinois Farmers' Institute shall have sole care and disposal of all sums that may be appropriated by the State to sustain the organization, and shall expend the same in such manner as in their judgment will best promote the interests in useful education among the farmers and develop the agricultural resources of the State. The Illinois Farmers' Institute shall make annual report to the Governor of its transactions, which report shall include papers pertaining to its work and addresses made at the annual meeting of the organization, and a classified statement of all money received and of all expenditures made, and twenty thousand (20,000) copies of such report shall be printed on or before Sept. 1 of each fiscal year, one-half for the use of the Illinois Farmers' Institute, and the remainder to the Secretary of State for distribution. It shall make no appropriation without funds in hand to meet the same, and the State of Illinois shall in no event be held liable or responsible for debt, obligation or contract made by the Illinois Farmers' Institute or its board of directors.

§ 5. There shall be held annually, under the direction of the board of directors, between Oct. 1 and March 1, following of each year, a public meeting of the delegates from county farmers' institutes and of farmers of this State at such time and place as may be determined by the board of directors, of not less than three (3) days duration, which meeting shall be held for the purpose of developing the greater interest in the cultivation of crops, in the care and breeding of domestic animals, in dairy husbandry, in horticulture, in farm drainage, in improved highways and general farm management through and by means of liberal discussions of these and kindred subjects and any citizen may take part in these meetings, but only duly elected and accredited delegates from county farmers' institutes shall be permitted to vote in the election of the board of directors.

§ 6. (As amended and approved May 15, 1903.) The members of each new board of directors shall enter upon their duties the second Tuesday after their election, and hold their offices for one or two years, as provided in section 3, or until their successors are elected and enter upon their duties. The board of directors shall have power to fill vacancies in the board. It shall organize by the election of a president, vice president, treasurer and secretary, who shall hold their offices for one year, their term of office to begin July 1 following their election. It shall employ such superintendents, speakers and clerks as may be deemed proper for organizing and conducting the work of the Illinois Farmers' Institute, and provide for their compensation by the rules of the board of directors. The secretary and treasurer may be other than members of the board of directors. The salary of the secretary shall be two thousand dollars ($2,000.00) a year, payable in monthly installments.

The Auditor of Public Accounts is hereby authorized to draw his warrants on the State Treasurer monthly for the salary of the secretary of the Illinois Farmers' Institute, as herein provided, payable out of any fund in his hands not otherwise appropriated.

§ 7. Rooms in the capitol building shall be assigned to the officers of this organization by the proper authority, which shall then be under the control of the board of directors.

§ 8. The board of directors may make and enforce such rules and by-laws, not in conflict with the laws of this State, as will render its work most useful and efficient.

§ 9. For the purpose mentioned in the preceding sections, said board of directors may use such sums as it may deem proper and necessary, not exceeding the amount appropriated therefor by the General Assembly from the general fund, for that purpose. *Provided further*, that the

1. State Superintendent of Public Instruction,
2. Professor of Agriculture of the University of Illinois,
3. President of the State Board of Agriculture,
4. President of the State Horticultural Society,
5. President of the State Dairymen's Association,

And the present congressional representatives of the Illinois Farmers' Institute Association shall constitute the first board of directors of this organization, who shall have charge of the affairs of the same until their successors have been duly elected, and enter upon their duties as provided in this Act.

AN ACT *making an appropriation for the Illinois Farmers' Institute and County Farmers' Institutes.*

SECTION 1. *Be it enacted by the People of the State of Illinois, represented in the General Assembly:* That there be, and is hereby appropriated to the Illinois Farmers' Institute the following sums, to-wit: For clerk hire, expressage, postage, office expenses, furniture, etc., the sum of two thousand five hundred dollars ($2,500) per annum; for typewriter and stenographer, one thousand dollars ($1,000) per annum, for the fiscal years beginning July 1, 1907 and 1908. The Secretary of State shall provide all needful books, papers, stationery and printing required, on requisition by the Secretary of the Illinois Farmers' Institute.

§ 2. For the several expenses of the members of the board of directors and officers of the Illinois Farmers' Institute in the performance of their duties as said members and officers, for the expenses of the State Institute meeting and for the incidental expenses in promoting the development of the farmers' institute work throughout the State, the sum of five thousand dollars ($5,000) per annum for the fiscal years beginning July 1, 1907 and 1908.

§ 3. For the use of each county farmers' institute for the purpose of holding one or more county farmers' institute meetings in each county in the State, the sum of seventy-five dollars ($75) per annum for the fiscal years beginning July 1, 1907 and 1908, said sum to be paid to the treasurer of each county farmers' institute, when such institute shall file with the secretary of the Illinois Farmers' Institute a sworn statement which shall show that said county farmers' institute has held one or more duly advertised public sessions annually, in accordance with such rules as may be prescribed by the board of directors of the Illinois Farmers' Institute, at some easily accessible location, which shall include an itemized statement of the expense of said meeting, with receipted vouchers therefor, a copy of its printed program and a report of the proceedings showing the title and author of the papers read and by whom discussed, place or places of meeting with average daily attendance, and such other information as may be called for by the Illinois Farmers' Institute and necessary to successfully assist this work.

§ 4. For the purchase of books for, and the maintenance and management of the Illinois Farmers' Institute Circulating Libraries, the unexpended balance of the former appropriation, eight hundred fifty-two dollars and forty-six cents ($852.46) is hereby reappropriated for the fiscal years beginning July 1, 1907 and 1908.

§ 5. No officer nor officers of any county farmers' institute shall be entitled to receive any moneyed compensation whatever for any service rendered the same.

§ 6. That on the order of the President, approved by the director of the congressional district, the secretary of the State Farmers' Institute shall draw his warrant on the treasurer of the State Farmers' Institute in favor of the treasurer of the county farmers' institute for the sum herein appropriated: *Provided, further,* that the program and reports of proceedings of the county farmers' institute, for which warrant is drawn, shall show that some of the following topics have been presented and discussed, viz: Grain farming, stock feeding and breeding, dairy husbandry, orchard and small fruit culture, farmers' garden, domestic science and any subjects pertaining to farm life: *Provided, further,* that if the necessary expenses of a county farmers' institute shall not equal the sum of seventy-five dollars ($75) as aforesaid, then said warrant shall only be drawn for the sum expended.

§ 7. It shall be the duty of the treasurer of the Illinois Farmers' Institute to pay over to the treasurer of each county farmers' institute the sum of seventy-five dollars ($75), or so much thereof as may be received for its use and benefit, as aforesaid, and make annual report to the Governor, as provided by law.

§ 8. The State Auditor is hereby authorized to draw his warrant for the sum herein specified and deliver the same to the treasurer of the Illinois Farmers' Institute upon his presenting voucher for same, signed by the president and secretary of said Illinois Farmers' Institute, and the State Treasurer shall pay the same out of any money in the State Treasury not otherwise appropriated.

Approved June 4, 1907.

BY-LAWS OF ILLINOIS FARMERS' INSTITUTE.

WHEREAS, by Act of the Thirty-ninth General Assembly, approved June 24, 1895, the Illinois Farmers' Institute was created, empowering its board of directors to adopt by-laws for its government and management of its business in connection with the act creating it, hereby adopts the following by-laws, and hereby repeals all former by-laws heretofore adopted by the board of directors.

ARTICLE I—DIRECTORS.

Section 1. Eleven members of the Board of Directors shall constitute a quorum for the transaction of business, except as may be otherwise provided by these by-laws.

§ 2. The Board of Directors shall hold a meeting in the institute rooms at the State House, on the second Tuesday after the annual meeting of the Illinois Farmers' Institute, the old board to dispose of its business, the new board to organize, elect officers and outline its policy for the ensuing year, and to transact such other business as may come before the board.

§ 3. Each director shall be the confidential advisor of the board and of the Superintendent of Institutes concerning institute affairs in his district; he shall report to the Superintendent at the close of the institutes in his district upon all matters that seem significant to his work, in order that the Superintendent may have a complete knowledge of the actual conditions in all parts of the State.

ARTICLE II—OFFICERS.

Section 1. The officers of the Board of Directors shall consist of a President, Vice President, Superintendent of Institutes, Secretary, Treasurer and an Auditor, to be elected by ballot by the Board of Directors, for the term of one year, whose term of office shall begin July 1st after their election.

§ 2. All officers of the Board of Directors must be members of the board, except the Superintendent of Institutes, the Treasurer and the Secretary.

§ 3. The Board of Directors shall have power at any time to fill vacancies which may occur in its membership.

§ 4. The compensation of all officers and employés shall be fixed previous to their election or employment.

ARTICLE III—PRESIDENT AND VICE PRESIDENT.

Section 1. The President shall be the Chief executive officer of the Board of Directors; shall appoint all committees; shall be ex-officio member of all standing committees; he shall preside over the meetings of the Illinois Farmer's Institute, the Board of Directors and the Executive Committee, sign all warrants for expenditures approved by the Auditor, Executive Committee or Board of Directors, and perform all duties incumbent on a presiding officer.

§ 2. In case of the absence or disability of the President, or in case of vacancy in that office, the Vice President shall fill the office.

§ 3. In case of the absence or disability of these officers, or in case both offices become vacant, any director or member of the Executive Committee who is called to the chair shall act as President for the time being, and sign all necessary papers.

ARTICLE IV—DUTIES OF SECRETARY AND TREASURER.

Section 1. The Secretary shall attend all meetings of the Board of Directors and standing committees, and shall keep a correct record of the same. He shall perform such other duties as usually devolve upon such officer. He shall act as Secretary of the annual meeting of the delegates and keep a record of same. He shall issue and countersign warrants for expenditures duly approved by the Auditor, Executive Committee or Board of Directors, but shall not draw a warrant on a fund unless there is sufficient money in the fund to pay such warrant.

§ 2. The Secretary shall be the custodian of all the records and papers belonging to, and all property owned by the Illinois Farmers' Institute, and shall report an inventory of all property of the Illinois Farmers' Institute to the Board of Directors at the close of each year; he shall make a detailed annual report in writing to the Board of Directors at the last meeting of the old board; he shall also make such other reports during the year as the Board of Directors or the Executive Committee may require.

§ 3. He shall be librarian of the Farmers' Institute Circulating Libraries, and shall submit to the Board of Directors or to the Executive Committee for approval, lists of books which he deems ought to be purchased for the use of the libraries when such are needed.

§ 4. The Treasurer shall have charge of all funds, keeping a separate account with each fund. He shall pay out the same on warrants signed by the President and countersigned by the Secretary, issued on approved bills. He shall, before entering upon the duties of his office, execute a bond signed by not less than two sureties, in the penal sum prescribed by the Board of Directors, not less than twice the sum likely to come into his possession at any one time; said bond shall be approved by the Board of Directors or committee duly authorized by the board to approve the same.

ARTICLE V—SUPERINTENDENT.

Section 1. The Superintendent shall have general supervision of institute work in the State under the direction of the Board of Directors and of the Executive Committee.

§ 2. He shall make recommendations as to lines of work which he believes will prove profitable for the ensuing year, together with general plans for their execution and estimates of expenses. He shall make such other recommendations to the Board of Directors as he may deem for the best interests of the institute work.

§ 3. He shall organize a bureau of speakers, including those from the College of Agriculture, whose allotment of time shall, as far as practicable, be under his direction. The speakers of the Superintendent's list shall be assigned work, as far as possible, in accordance with requests from the district directors, or officers of county institutes. He shall attend the district conferences if posible, aid in the arrangements of such circuits of institutes as will prove the most convenient for the attendance of speakers.

§ 4. He shall in connection with the Sercetary, have charge of the publication of the annual report and shall insert therein such matter as will advance the agricultural interest of the State, under the direction of the Executive Committee, and the Secretary shall have charge of that part of the report covering the transactions of the Board of Directors and the Executive Committee and all matters of finance.

§ 5. He shall make a detailed annual report in writing to the Board of Directors at the last meeting of the old board, of his acts and doings during the year, together with a general summary of the institute work of the State for the year; he shall also make such other reports during the year as the Board of Directors or Executive Committee may require.

ARTICLE VI—AUDITOR.

Section 1. All bills for expenditures ordered by the Board of Directors or the Executive Committee and all bills contracted in pursuance of any appropriation shall be referred to the Auditor.

§ 2. The Auditor shall carefully examine all bills, and when approved, shall return them to the Secretary with recommendation that warrants be drawn in payment of the same. In case a bill is not approved, it shall be referred to the Executive Committee.

§ 3. The Auditor shall carefully examine all reports from County Farmers' Institutes and the bills for expenses of the same, and if in compliance with the law providing appropriations for County Farmers' Institutes and the rules prescribed by the Board of Directors either approve the same, or if not approved, refer them to the Executive Committee.

§ 4. The Auditor shall examine the books and records of the Secretary and Treasurer and make a detailed report of their financial transactions up to July 1, of each year to the Board of Directors, and at other times when directed to do so by the Board of Directors or the Executive Committee, and shall report the accounts against which no warrants have been drawn, in the different funds, and the balances in the hands of the Treasurer to the credit of each fund.

ARTICLE VII—STANDING COMMITTEES.

Section 1. There shall be created the following standing committees, the President appointing four members of each committee:

Executive Committee.
Highway Committee.
Legislative Committee.
Committee on Domestic Science.
Committees on Ways and Means of Improving County Farmers' Institutes.
Committee on Agricultural Education in the Public Schools.
Committee on Soil Investigation and Experiments.

§ 2. The duties of standing committees, unless otherwise provided by these by-laws, shall be legislative in character; they shall meet at the same time and place that the Board of Directors meetings are called, and at such other times as may be necessary, and shall make a written report to the Board of Directors at their annual meeting and at such other times as may be called for, said report to show progress made and future needs in their respective lines of work.

ARTICLE VIII—EXECUTIVE COMMITTEE.

Section 1. The Executive Committee shall conduct the affairs of the Illinois Farmers' Institute in the interval between the meetings of the Board of Directors in accordance with the rules and resolutions adopted by said board.

§ 2. It shall make all arrangements for holding the State Farmers' Institute meeting, assigning the time and place.

§ 3. It shall prepare a list of speakers for the use of County Farmers' Institutes.

§ 4. It shall pass on all bills referred to it by the Auditor of the Board.

§ 5. It shall be official advisor of the superintendent of institutes when the Board of Directors is not in session.

§ 6. It shall meet on the call of the President of the Board of Directors.

ARTICLE IX—HIGHWAY COMMITTEE.

Section 1. The Highway Committee shall co-operate with the State Highway Commission in its efforts to secure good roads and shall report from time to time such measures as may be recommended for the improvement of public highways.

ARTICLE X—LEGISLATIVE COMMITTEE.

Section 1. The Legislative Committee shall prepare the bill or bills to be presented to the legislature for enactment, and when the same have been approved by the Board of Directors or Executive Committee, shall take all necessary measures to have the same enacted.

ARTICLE XI—COMMITTEE ON DOMESTIC SCIENCE.

Section 1. The Committee on Domestic Science shall counsel with the State Domestic Science Association and report upon measures for the advancement of their work.

ARTICLE XII—COMMITTEE ON WAYS AND MEANS OF IMPROVING COUNTY FARMERS' INSTITUTES.

Section 1. The Committee on Ways and Means for Improving County Farmers' Institutes shall take into consideration the methods adopted in the management of County Farmers' Institutes, the program given the arrangement of circuits of institute meetings the employment of speakers, and report to the board any recommendations that may tend to improvement on these lines.

ARTICLE XIII—COMMITTEE ON AGRICULTURAL EDUCATION IN THE PUBLIC SCHOOLS.

Section 1. The Committee on Agricultural Education in the Public Schools shall collect information in regard to the character of the agricultural work being done in the schools in which agriculture is taught, the methods of teaching, and report to the board on the progress being made therein.

ARTICLE XIV—COMMITTEE ON SOIL INVESTIGATION AND EXPERIMENTS.

Section 1. The Committee on Soil Investigation and Experiments shall advise and co-operate with the director of the Agricultural Experiment Station in making chemical and physical examination of the various soils of the State, and in ascertaining by direct experiment in laboratory and field, the crops and treatment best suited to each; it shall visit the soil experiment fields and report to the board the results of the investigations and experiments.

ARTICLE XV—AMENDMENTS.

Section 1. These by-laws may be amended at any regular meeting of the Board of Directors, by a majority of those present voting in the affirmative.

ARTICLE XVI—RULES.

Section 1. Roberts' rules of order shall govern in all cases not otherwise provided for.

RULES PRESCRIBED BY THE BOARD OF DIRECTORS FOR THE MANAGEMENT OF COUNTY FARMERS' INSTITUTES.

Rule 1. The director of each district consisting of more than one county shall, at the request of the executive committee, or superintendent of institutes call a conference of his district at some convenient point, consisting of the president and secretary of each county farmers' institute (or persons selected by them as alternates) for the purpose of arranging the time and place of holding the next county institutes in the district and co-operating in securing the speakers. All necessary expenses of the two said delegates in attending said congressional conference shall be paid by the Illinois' Farmers, Institute upon itemized bills approved by the director of said district.

Rule 2. The directors approval shall be required in fixing the dates of the institutes in his district.

Rule 3. The secretary of each county institute shall submit the completed institute program to the district director for his approval before having it printed and distributed, and this shall be done at least twenty days prior to the time for holding the institute.

Rule 4. The director shall forward each completed and approved program, to the superintendent of institutes, which, if found to be in accord with the appointments provided for at the district conference shall be printed and 1,000 copies forwarded to the secretary of the county farmers' institute at the expense of the State Farmers' Institute.

Rule 5. No part of the State fund shall be expended for music, recitations, amusements of any kind, or for premiums.

Rule 6. No county farmers' institute meeting shall be held in connection with a street or county fair, a circus, a political meeting or any similar attraction.

Rule 7. The publication and mailing of a copy of these by-laws and rules to each county institute officer shall be deemed sufficient notice that vouchers for expenses prohibited herein will not be paid by the State.

Rule 8. Nothing in these by-laws or rules shall be so construed as to prohibit a county farmers' institute from expending its own money as the officers may deem proper: *Provided*, the State fund is expended in accordance with these rules.

Rule 9. In the case of removal from the county or refusal to act, on the part of any county institute officer, the director of the district shall appoint a suitable person to fill the vacancy and this appointee shall serve until his successor shall be elected at the next regular election.

RECOMMENDATION TO COUNTY INSTITUTE OFFICERS.

Any exhibits in connection with a county farmers' institute, wherever practicable, should be displayed in a room separate and apart from the one in which the institute meeting is held, and said room should be closed while the institute is in progress.

By order of the Board of Directors, June 29, 1907.

Proceedings of the Thirteenth Annual State Institute Meeting.

FIRST DAY OF INSTITUTE.

MORNING SESSION, TUESDAY, FEBRUARY 11, 1908, 10 O'CLOCK. COLISEUM BUILDING, PEORIA, ILLINOIS.

Chas. W. Farr, President Illinois Farmers' Institute, Presiding.

CHAIRMAN FARR—LADIES AND GENTLEMEN: It is a pleasure for me to stand before you this morning in the opening session of the Thirteenth Annual State Meeting of the Illinois Farmers' Institute, and to know that it is begun under such favorable auspices. I sincerely trust that the influences of this convention will be wide-spread and of lasting benefit to the farmers of the State of Illinois.

It has been said that greatness may be attained in any one of three ways. In the first place, a man may earn greatness, and that is the particular kind I wish to recommend.

In the second place, a man may be born great, for which he deserves no especial credit. He could not help it.

In the third place, now and then it does actually happen that a man may have greatness thrust upon him, and as far as the presidency of the Illinois Farmers' Institute is concerned at the present moment, the man belongs to the third class of greatness.

A combination of circumstances entirely beyond the control of any one makes it necessary for a school teacher to act as chairman of this meeting. But after all, it is not such a bad combination, because the schools of Illinois need the farmer; the farmer of Illinois needs the schools; therefore they must work together in a common cause, and anything that will bring those two influences into closer working unison, is worth while.

But before we have gone too far in our proceedings this morning, we must have a welcome. The mayor of Peoria is not able to be present to do that work, but he has sent a very worthy representative in the person of Hon. Thomas N. Gorman, one of the city aldermen. We will now hear from him. [Applause.]

ADDRESS OF WELCOME.

(Hon. Thomas N. Gorman, Alderman, Peoria, Ill.)

MR. PRESIDENT, LADIES AND GENTLEMEN—Owing to the illness of our Mayor, it was only last evening that I was requested to come here in his stead, and

I am going to ask you to bear with me relative to the brevity of my remarks. To do this question justice there is subject-matter enough to consume the entire day, but as you have on your program a number of able speakers, I will not attempt to discuss these matters at length.

The citizens of Peoria are much pleased at your selection of this place for your convention, and as an evidence of that pleasure the Mayor intended to come here and extend to you in behalf of our citizens a hearty welcome; but on account of his illness I have been deputized by him to act as his substitute.

I have no doubt but what my selection is owing to my knowledge of farming, of which I have as much as the ordinary alderman.

I remember the time when cotton was king in this country. This cannot be truthfully claimed any longer, for corn wears the crown; a crown that is in danger of being taken by the hen, for her product is coming to the front. There is a fortune in eggs for those who have them to sell, but the reverse to those who eat them. There are fortunes in beef, in butter and many other products that the farmers supply.

The farmer who is industrious and prudent, has comfort, wealth and health. The wise farmer sticks to his farm and is not allured to the city, where he often exchanges his farm and its comfort for the shoddy gentility of the city. That man is blessed who owns a farm and cultivates it well.

The farmer as a rule loves his country—is a patriot. His broad acres that he has won from Nature's roughness, and which he wishes his children to inherit, supply him with the motive to fight for it or if necessary to die for it.

The farmer and the farm are the strength and safety of our country. Gentlemen, I do not envy you your happy state, but I say most sincerely that I wish I was one of your number.

I bid you in conclusion a hearty welcome and wish you to come again. [Applause.]

RESPONSE.

(President Chas. W. Farr., Chicago.)

Mr. Alderman, Ladies and Gentlemen—The State of Illinois always has, does today, and always will need men and women of the highest type. And if that need is supplied, one of the most fruitful sources in supplying it will come about when the agricultural activities and the educational institutions see the advisability of working together along the line of making better men and women.

We believe that this meeting will be the most effective of any of the annual institutes held thus far, and that its influence over the state will be a decided power for good. With due respect for and appreciation of the great work that the agricultural college, the experiment station and the U. S. Department of Agriculture are doing, and recognizing the value of all the printed matter that is being sent out by them, notwithstanding all this, we are beginning to realize the necessity of oral instruction such as we are to have here for the next three days, and such as we have had in the Farmers' Institutes over the State in the different counties for the past two or three months, and we know it will be very effective. In this oral instruction the inspirational up-lift is very marked, and out of it grows an interest in the valuable printed material sent out by the different departments.

The intrinsic value of the printed matter is not sufficient to get it before the public satisfactorily, however great that value may be. The thing that has to be done is for friends of the movement to crowd this printed matter, and present it to the people, wherever an opportunity is afforded, whether it be in a local farmers' meeting, or in a teachers' meeting, or before men's or women's clubs. It is the duty of the man who is interested in the cause to distribute printed matter of what is printed for us by these people whom we are hiring. Emphasis should be put upon the responsibility of each of us who is interested, to talk this thing. We don't talk enough about it. It is the personal contact that appeals, the inspiration of the man that appeals. If he talks, and if he backs up his talk with a distribution of printed matter, it will inspire his hearers sufficiently so that they will read easy things. After they read them, they will send for some of them, and if they do that, they will begin to attend county meetings. When all this is done, they will begin to look toward the State University. Only a small per cent send for bulletins or circulars, and very few read them. In practice you have got to build up to the bulletin over this road. First is the personal inspiration, then a little easy reading of extension bulletins brought into the school, and then getting to the university. When farm boys and men have taken the two-weeks' course in corn, they will be interested enough to read some of the bulletins. A very great per cent of the boys who are in high school who did send for a good bulletin would not read it after they got it, unless they had had this training leading up to it.

The rural district hires a teacher to run the school. I am a school man. It is only business that I should recognize the business in which my employers are engaged, and help them in it. If I am employed by farmers I am under obligations to see what this man and the other one in the community are doing. For instance, I want this school to inspire and teach this boy to raise better corn.

The farmer needs the school and therefore the school must help the farmer. Then the school needs the farmer and his industries and his influence just as much as the farmer needs the school. This boy must be taught to read, to love good reading, to figure, to write, to spell, and to do all the things that a man needs to do. Therefore, I would take a farm with its industries, bring them into the school and have the pupils read about that thing and write and figure about that thing. Make the farm and its industries a basis for concrete work in the school.

In suming up, I would say in regard to the necessity of this oral instruction that I speak of, this necessity has brought about the corn specialty, has brought about the seed and soil specialty, has brought about the county institute, and last of all, has brought about the annual meeting of the Farmers' Institute. We can handle—or rather the railroads can handle—some of these activities, some of these institutes, the county can easily handle its own county institute, but when it comes to the annual institute, it is necessary for us to call upon some city of Illinois to furnish the facilities that will make it comfortable for us.

We appreciate very much the fact this morning, that this city of Peoria extends to us this invitation, and it gives me very great pleasure to call upon Judge J. Otis Humphrey, of Springfield, Illinois, to respond to this kind welcome. [Applause.]

RESPONSE.

(Judge J. Otis Humphrey.)

Mr. President, Mr. Alderman and Members of the Institute—I have no prepared address for you this morning. I suppose I was selected on the program because of my well-known interest in the work that the farmers of Illinois are doing, some of them trying to do well.

I have been a farmer all my life; I have been some other things besides, but I never stopped farming. Born and brought up on an Illinois farm, my interest in the soil, in the products of the soil, in all that good farming produces, from men and women to the more material products, I regard it today as the most important vocation belonging to the human family. It is so necessary that all other interests depend upon it, all other vocations await its results. Our fathers saw the importance of this, our government was organized by agriculturists; our early presidents were all from the soil, and in my judgment the best public officers we have had from that time to this, are the country-bred boys who have allowed the best there is in them to develop into the best they could do. From the days of Washington down, there never has been a time in this country when the business of farming, dealing with the soil, studying the secrets of nature, has not been the vocation of the best men among us. We get into the habit of thinking that the days of making money on the farm are past. The census figures show us that in a decade the population of the cities has increased over 60 per cent. While the population of the rural sections of the country has increased only 14 per cent. What does that mean? It means that there are more people, as time goes by who would rather live in some other vocation, would rather live from day to day, than from year to year, or from one generation to another; for that is what the wise farmer does, he lives and works for the future. It means another thing. It means that every man and woman that leaves the farm and goes to the city, becomes a consumer instead of a producer of those things which sustain life, and as 60 per cent of the increase is in the city and only 14 per cent in the country, you see the increased opportunities for the farmer. That means more and better results for the same labor. Better prices for the same crops than you had before, and as we go skipping along just touching the high places in this country, the most of us neglect to think about this great question of population.

JUDGE J. OTIS HUMPHREY.

The history of the whole world shows that no *farming* community ever yet figured high enough on the increase of population. Men have gone along in the countries of Europe, the older developed countries of Europe, and of the world, and have parted with their lands supposing they had reached the top of the market; they said, "lands never get any higher than they are now, we will sell ours," and they have gone along and you see farm lands, ordinary lands today in England selling for from seven hundred dollars to a thousand dollars an acre. Those lands are not any more productive than ours, but they are within twenty-minutes of London, where five million hungry mouths are fed.

THE TRANSPORTATION QUESTION.

Now, some of us have lived through a period when we have seen transportation begin and develop in America. Many of you gentlemen who listen to me remember when farms in Oneida county, New York, were worth twenty-five or fifty times as much per acre as farms in this county. You and I have lived to see those two prices meet and Peoria county farms are worth today as much per acre as the Oneida county farms. It is wholly a question of transportation. It is the transportation problem, so far as it has been settled in this country, that has developed the country; that has made these things possible that I am talking to you about.

THE FARMER THE BASIS OF THE GOVERNMENT.

The farmer is the basis also of the government. He has more interest in the government; he has more interest in *good* government than other people, because everything that he has depends upon his government. He cannot pick it up and carry it off with him in the night time. He cannot arrange this week that next week he will live somewhere else and take everything he has got with him. He is tied to the government and the government is to him, and the one depends upon the other, and in that sense greater responsibility rests upon the farming element of this country than rests upon any other element. All thinking people recognize the fact that the great conservative element of American politics today is the farming element. Other people can be aroused, excited, driven or led, but you must give the farmer time to *think it over*. If you don't give it to him he will take it, and when he gets his mind made up he will move and act, and generally his action is about right on the great public questions which move the country.

Now, gentlemen, farming is a better business than it used to be. It is a more independent business. It always was an independent business, always was the most independent of all the vocations in the world, but it is becoming more so all the time. The farmer, above all other men who work for a living, fixes his own hours of labor and of leisure, and there are many seasons, indeed, when there is little for him to do but rest. I happen to know in my professional life, both as a practitioner and as a judge upon the bench, that the best jurors to be had anywhere are the farmers. I have tried it, and I know what I am talking about. I tried cases for eighteen years and have heard cases for several years, and I learned to know that the farmer is the juror who is least of all affected by local conditions or by State wide conditions or by national conditions; he has got the levelest head; he is the most conservative man; he is the most open to argument of any class of men called into the jury box.

Don't get frightened because land is high. We have just begun to farm in this country. We have just been playing at it in the past. Land is not high here yet. We have not begun to get the value of these Illinois lands. The alderman referred to the fact that corn has now developed into the king of all the material products of the soil. That is true. And, do you know, we have found all the corn land there is in the whole round earth, *and there is not enough of it to go around* It will never be worth any less money than it is today, but in my judgment it will increase in value far beyond the highest conception of the most of us.

Why not? The population is sure to increase. The demand for corn will be more because of the greater population. We are constantly finding new uses for it. And we cannot find any more corn land. We know where every acre of it is, and, as I said before, there is not enough. Now, there is a great deal of wheat land yet to be developed, a great deal of it. But we know where all the corn land is. You will never see any more cheap corn, in my judgment, in Illinois. I remember when I was a child, before the war—just before the war my father bought thousands and thousands of bushels of corn at 8 cents a bushel. I have known him frequently to buy corn at 12 cents a bushel; and all of us have seen corn sell at 20 cents a bushel. And eleven years ago the man who worked the land that I now own in Sangamon county sold the crop for 14 cents a bushel. That will make some of you shudder. You think, "Can that be possible, that was only eleven years ago?" Yes, that was 1896-7 that that thing happened. that very thing happened, and sheep were so cheap that they were given away. Horses were so cheap that they disorganized the anti-horse thief societies. [Laughter.].

Now, these things don't come by accident. We are on the *up grade*. More people, more uses, more demand for the products of the farm will bring the farmer to his own. So don't get frightened about high prices of labor. The farm laborer is not getting any more than he deserves to have. If he is any account he is worth the wages you are paying him. Just go and compare him with the man who is working on the section, the man who is putting in the bridges on the railroad, the man who is doing the manual labor for the corporation and other enterprises; the men who are working in the factories of the country, who are making wages to buy the products of the farm. Compare the wages you are paying your men with the wages those men are getting. You will have to make up your minds that you cannot pay any less wages to the men who raise fifty bushels per acre of 40 or 50 cent corn.

Farming is more agreeable than it ever was; more comfortable than it ever was. We have taken hold of the arm of the scientist and are studying along with him. Now, some of us are in the habit of speaking slightingly of the scientist. But I tell you, my brothers, the scientist is the only man on earth who demonstrates; therefore, he is the only man who knows absolutely what he is talking about. Science is simply a knowledge of the secrets of nature. Nature works by law, and she never goes back on herself. She never crosses her track. When you learn a rule of nature, a law of science, you can rely upon it. It is not so in politics. It is not so in any profession. There you deal with men. [Applause.] Where you deal with animals, where you deal with grain, where you deal with soils, when you go to bed at night you think you have a reasonable probability of finding them in the morning where you leave them at night. Not so in this fierce struggle of man with man. It is a brain racking, nerve racking business when we fight humanity. If I go into a law suit against my brother, or if two of them come into my court before me, the best that any of us can do, even if justice prevail in the end, one man goes home "licked." One side goes home in sorrow and defeat. This is the best result that any of us are able to bring about when the ends of justice have prevailed; this is the best result possible. But if you go out and battle with Nature, taking her by the hand and working in accordance with her laws, and with the sunshine and the dews, and the rains and the soils, and the chemical properties of the earth to help you; doing your best, studying your best, learning a method by which you can make an old, worn out farm, producing twenty-seven bushels of corn to the acre, produce eighty bushels to the acre, you haven't defeated anybody, you haven't made anyoody feel bad, you haven't brought sorrow to any human heart. On the other hand, you have helped yourself, improved your material prosperity and taught your neighbor to do a great good for his country. [Applause.] You raise a better colt than has ever been raised in your neighborhood before; bring in a better stallion, a better bunch of mares, and you have helped the whole township as well as yourself. You raise a better hog—and about the only idea I have got about a good hog is a hog that will weigh 300 pounds the quickest—you teach your neighbor how to do that, and you have not hurt anybody, you have helped yourself, you have helped your country, you have not brought sorrow upon anybody.

It is a gentlemen's business, farming is. The great Washington was not too great for it. Madison and Monroe and Jefferson, all went back to the farm when they got through with the duties of the presidency. Our great Governor and Senator—Oglesby—went back to the soil when his official life was over. I tell you it is a *gentleman's* business, and don't you take off your hats to any profession on earth. And we do good work here, and our percentages are a little better than we have been doing in the past. There is no country on earth where the hand of man has tilled the soil long and continuously that he has not ruined it. *And if we, here in America, shall teach the world how to use the land without abusing it, we will have written a new page in history.* We will have made ourselves a name that will live forever, not only as agriculturists, but in the history of the progress of the world. Why not do it? Why not do it? [Applause.] We have the assistance of the scientist to help us to do it. In the ages of the past, science has been locked up in dingy rooms for the use only of the privileged few; but in our days science takes her sister industry by the hand and comes to teach the American farmer the secrets of nature which will develop and preserve the use of the soil, making it better in the use. And the American artisan today understands the uses and purposes of his art, and by lense and crucible he combines and separates the forces of nature and shapes and harnesses them for our use, and while he blesses himself materially, he blesses mankind in the knowledge he imparts. Let us all be scientists to this extent. Now, my father was a good farmer. He got along fairly well. He struck this country when the soil was fresh and fertile. He knew that red clover would enrich the soil, but I have not the least idea that he knew why. I feel sure he could not have told why. He knew that keeping cattle and hogs in large numbers on a farm and grazing the land, four, five or six years at a stretch, then making new pasture and plowing up the old would keep the land better in fertility than to raise grain and haul it to market, but I haven't the slightest idea that he had the definite knowledge why! It is the business of the scientist to teach us *why*. Ever since our first parents made that *fatal blunder* the human race has been striving for knowledge. Nobody has ever been satisfied until he has learned why! And nobody ever does very good work at a business unless he knows why. Why! And here we have in Illinois a great department, made possible by the national government, sustained and supported with marvelous loyalty by our State authorities, to teach us why. A few years ago, about five years ago—indeed, it was five years ago last November—Dr. Hopkins came down to my place and spent a day with me and took home some of the soil for analysis. A school house stands adjoining the farm, on a plat of land that never has been plowed. You see what an elegant opportunity we had to learn by comparison what was the virgin soil. There is a strip of land 200 feet wide running clear through the State of Illinois that is in the same condition—the right of way of the Illinois Central railroad. Any man in Illinois can learn what his soil lacks to restore it to its original fertility. It won't cost him anything to do it. Now, isn't that worth doing? Just stop a second and ask yourself, "Is it worth while for me to know what this soil was originally?" And then you can go and figure, and that is time enough to figure. Don't get scared on the start. Then go to figuring what it will take to put it back to its virgin state. All of that is easily possible. And then farming is more comfortable nowadays for another reason—because of the ease and pleasure with which we are allowed to do it, because of the rural mail line, because of the trolley line, because of the telephone, because of the increased facilities for transportation. All of these things, most of these things, our fathers did not have at all. Some of them they never dreamed about. They were beyond human conception. Oh. farmers of Illinois, if you only knew the marvelous future that lies before this State of ours! Here we are in the center of the Mississippi valley, not too far south, not too far north, the very garden spot of the richest piece of territory of like extent which can be found in the whole round earth.

The government will survive. I have all faith in that. If the government survives, Illinois will be the commercial center of the world. That is sure to come. [Applause.] All indications tend to it. We are to have a deep waterway from the lakes to the gulf. When it comes—and it is sure to come—when it comes every acre of this land in Illinois increases in value. Illinois then becomes the greatest water power of any of the states of the Union. Factories will be developed here so thick that our population will double and treble while you wait. The great cities of the nation will be Chicago, St. Louis, Memphis, New Orleans. Ocean liners will come up the Illinois river, past this city of Peoria, and take freight for the ports of the whole round world. [Applause.] You know what that means to Illinois farms and farmers. Every one of them will be farming, I was about to say on his knees. That is the way they farm in Europe. Oh, if you had seen a few of the scenes that European travelers have met with. I tell you we are just playing with the business of agriculture. We have not begun to do business yet. We don't know what a heritage we have here. I do not think I am over-enthusiastic about this. I wish I could have before me, to instill into their minds some of the enthusiasm that I conscientiously feel on this subject, all of the young men whose fathers are farmers in Illinois. [Applause.] For it is the *youth* of the land that must make this development that I have been talking about. Here we are this morning, just a handful of us. In Illinois the great mass of our people are farmers; and yet here we are, just a few of us interested in these great subjects. But it will come! The professor is on the right track. Teach it to the children! Teach it to the children! "He who has cultivated man has seen nothing. He should cultivate woman. He who has cultivated woman has done nothing. Let him cultivate childhood!" [Applause.] That is where the power of the nation resides, and I tell you, my brothers, the schools of Illinois will make this thing go. [Continued applause.] At our county institute down in Springfield, oh, I don't know how many, several thousand of the children were present there, and Professor Farr had a stereopticon lecture there for them; and that is the way we are trying to do it over in Sangamon. Professor Pruitt here, the superintendent of our county schools, is a man who deserves more credit for doing work beneficial to the farmers of Sangamon county than any farmer in it. [Applause.] Sooner or later we will get these great subjects drilled into the children of the day, and we will make it the law.

Now, I have talked to you infinitely longer than I expected to. Mr. Alderman, on behalf of the members of this institute I desire to return to you our heartfelt thanks for the kindly welcome which you have given us to the city of Peoria, and I hope you gentlemen will ask your directors to vote to hold the next institute at Springfield. [Applause.]

SUPT. FRANK H. HALL.

CHAIRMAN FARR—We will now listen to Dr. Hall's report, as superintendent of institutes of the State of Illinois, and while he has the floor we will call for the district director's reports.

SUPERINTENDENT HALL—Mr. President and Gentlemen: It is hard to get away from the tribute to the farmer that has just been paid by Judge Humphrey. He mistakes, though, when he looks out upon this small audience and thinks that these are all to whom he is talking. He doesn't see the lady behind him. Watch her pencil. She is putting down every word. We will print it in thousands of volumes and send it to the people. Besides, there will be hundreds of newspapers tomorrow morning that will get something of it, and many hundred times as many people as are here will read it.

One thought struck me exceedingly forcibly. He says: "If we teach the people to use the land without abusing it, we will write a new page in the world's history." I had not thought of that in just that way before. It is a grand work, truly, that we are engaged in if we can do that. I did not realize myself so fully the changed conditions under which we are working, changed from those under which our fathers worked and under which we worked in the early days, until I listened to the address of Judge Humphrey. I am glad he used every moment of the time he did, and although time will not permit me to read all the voluminous manuscript I have in my hands, you will have an opportunity to read it. It will be printed. I have in my hand not only my own report, but reports from nearly every district director in this State. Of course, I cannot read one-tenth of it. I shall only make a few selections, then call upon each director present to say a few words in regard to the work in his own district.

SUPERINTENDENT'S REPORT.

Institutes have been held this year in all the counties of Illinois except two—Menard and Henderson. The interest as reported to the superintendent by directors, speakers and county officers has, with few exceptions, been commendable. It is true that in some localities the attendance was disappointing. In other places the numbers exceeded the attendance of any previous year. In each of nineteen counties more than one institute was held. In some of these counties the extra institutes were organized by the regular county officers and in others "independent" institutes were held. In some counties township institutes have been organized and in others farmers' clubs. The institute spirit is abroad, as evidenced by the following list of counties, in each of which more than one institute has been held:

Winnebago county	6 days in 4 towns
Woodford county	6 days in 4 towns
Edgar county	5 days in 4 towns
JoDaviess county	3 days in 2 towns
Cook county	3 days in 3 towns
Henry county	8 days in 3 towns
McLean county	7 days in 3 towns
Livingston county	4 days in 2 towns
McHenry county	4 days in 3 towns
Boone county	5 days in 3 towns
Wayne county	4 days in 2 towns
Whiteside county	4 days in 2 towns
Moultrie county	4 days in 2 towns
Randolph county	4 days in 2 towns

Sangamon county held a three-day institute and several township meetings. Great effort is being made to organize every township in the county.

Kane county held a three-day institute at Elgin and will hold a one-day institute at Sugar Grove February 18. There are three farmers' clubs in Kane county, each of which holds ten meetings a year.

Tazewell county held a three-day institute and has a club that meets several times a year.

Brown county has held one institute and will hold another February 20 and 21.

JoDaviess county is trying to arrange for another day of institute in each of two towns and will endeavor to interest adjoining counties, so that a circuit of four or five institutes in as many towns may be arranged.

The Grout encampment was held this year in connection with the Scott county institute. This was really five days of instruction to young people by such teachers as Director Grout, Professors Russell, Crane, Hegnauer, Messrs. Corsa, Fulkerson and Rowe. This was thought sufficiently important to warrant the publication of a bulletin giving parts of the addresses and other valuable matter. Editor A. J. Bill prepared the bulletin, and through Secretary McKeene it was printed and thousands of copies sent to different parts of the State. One of the results of the encampment plan inaugurated by Director Grout in Scott county is that Rev. C. S. Lyles, formerely of Winchester, is now making efforts to provide the necessary funds for an "encampment" next summer at Lovington, in Moultrie county. The writer has just learned that the state of Missouri is becoming inoculated with the encampment bacillus. Mr. S. M. Jordan of Stanberry, Mo., invited the boys of Gentry county to a five-day encampment on his farm. Mr. Gentry furnished tents, sleeping quarters and board for all who came. One hundred twenty-five accepted his invitation.

Certain it is that the two encampments in Scott county, 1906 and 1907, and the two encampment bulletins sent out, one by the Agricultural College Extension Department of the University and the other by the Illinois Farmers' Institute, have done much to awaken interest and stimulate effort in the study of modern agriculture by the boys of Illinois and elsewhere.

The institute season began this year in August and will extend into March—possibly into April or May.

Number of counties that have reported to date	77
Of the counties reported—	
Number in which 2-day institutes were held	43
Number in which 3-day institutes were held	31
Number in which more than 3 days of institutes were held	3
Number of days institutes reported	194
Number of sessions of institutes reported	442
Total attendance reported	88,905
Total cost reported	$11,752.58
Of this the State paid	5,205.67
County boards (26 counties) contributed	2,500.00
Contributed from all other sources	4,046.91
Smallest appropriation by any one board	25.00
Largest appropriation (Sangamon county)	300.00

The following have not reported: Adams, Boone, Carroll, Champaign, DuPage, Ford, Greene, Grundy, Henderson, JoDaviess, Kane, Lake, Lee, Livingston, McHenry, Madison, Menard, Moultrie, Ogle, Scott, Stephenson, Vermilion, Whiteside, Will, Winnebago; total, 25 counties. Boards of supervisors assisted in this work in upwards of thirty counties, $25.00 to $300.00 each.

Printed programs were furnished from the office of the secretary to seventy-eight counties.

One hundred thirty-three young men were recommended for free scholarships in the College of Agriculture, most of them being graduates from high schools.

Extra Work Done by the Institute.

In addition to the work done by the State Institute in former years, one large circular, 7,000 copies, and one extra bulletin, 10,000 copies, have been published and in part distributed through the mails and otherwise.

The press bureau work, for the inauguration of which former President Schermerhorn must be given great credit, has been carried on at an expense, including postage, of nearly $600.00. Forty articles, averaging 1,400 words each, prepared by Editor A. J. Bill and sent out by Secretary McKeene, have been furnished to 235 newspapers. It is believed that more than half of the editors to whom these articles were sent published them. (Forty-six have sent copies of their papers containing the articles to the secretary's office.) It is believed that the average circulation of these newspapers is not less than 1,500. Hence, the forty articles have gone into nearly 200,000 homes and have been read by perhaps three times 200,000—600,000 people. Thus the words of the institute speaker are presented to a thousand times as many people as come within the sound of his voice; in some instances, no doubt, to more than a million people. If the function of the institute is the dissemination of agricultural knowledge, surely the press bureau is an economical way to do it.

Through the action of the executive committee the superintendent was instructed to employ an assistant in the field work. He employed Professor Joseph Carter of Champaign. Testimony as to the great value of the work done by Professor Carter has come to the superintendent from many sources. This work has cost the State Institute this year $10.00 for each institute visited, amounting thus far to nearly $350.00.

All this work has been provided for by the State organization in addition to what has been done in former years, and there remains in the treasury a sum sufficient to defray the ordinary expenses of the institute, without danger of deficit at the end of the fiscal year. The credit for managing the business end of the State Institute work must be given to your secretary, H. A. McKeene.

In addition to the foregoing, Secretary McKeene, by order of the Executive Committee, accompanied the Committee on Soil Investigations and Experiments on one of its tours of inspection, and has prepared a report of the soil fertility work as revealed on this tour, including seven fields—a report that has been approved by Dr. Hopkins and that will soon be given to the public in the form of a bulletin or circular.

SPEAKERS FROM THE COLLEGE AND STATION.

The plan for sending out speakers from the college and station was somewhat modified this year. Instead of sending two specialists to each two or three-day institute, it seemed advisable to send one specialist only, and a speaker who would present in a more general manner, perhaps in a single lecture, several phases of the work done at the college and station. One reason for this change was in the fact that in nearly every agricultural community there is a great variety of interests, as the raising of corn, wheat, oats, clover, sorghum, alfalfa, milk production, butter making, the selling of milk and cream, using the separator, the milking machines and the Babcock test; beef production, the raising of horses, sheep, swine; the nutritive ratio and the balanced ration; egg production and the raising of broilers and capons, etc., etc. This makes great variety desirable in an institute program. This variety can be better provided with one specialist and one "agricultural extension" man than by two specialists. Moreover, the institute necessities of the agricultural specialist are in large measure provided for by special organizations, as the horticultural societies, the dairymen's association, etc. These special organizations look to the college and station for speakers, and perhaps are as much entitled to assistance as are the institutes themselves. Indeed, these associations are in fact the sectional divisions in the great institute field. The place of these speaker specialists is, for the most part, in the special organizations and in the sectional meetings of the State institute. The agricultural specialist will listen attentively and profitably to the speaker specialist, but the general farmer is not prepared to profit so much from a consideration of the intricate problems and extended detail in which the investigator takes unmeasured delight, The general farmer, as a rule, simply wants the results of the investigation given, if you please, in the most empiricical manner.

But there are specialists to whom the general farmer will listen attentively and profitably, only provided at least ordinary skill is used in the presentation of the subject. I refer to such specialties as are of very great practical interest to every farmer, be he one of the "general" kind or of the special sort. One of these specialities is the study of the soil, whether from a chemical, physical or biological point of view. Another is the study of insects from an economic view point. A third is such a study of the balanced ration as will apply to the feeding of all farm animals, including the farmer himself and his wife and children. Such topics as these will appeal to every farmer; while the subject of dairying interests only those who are engaged in that specialty, and the subject of beef production only those who are raisers or "feeders" of beef cattle.

The new plan for sending out speakers is designed to meet the conditions herein set forth. It gives a little less prominence in the county institutes to the man who devotes his life to the investigation of some specialty for securing results that will be of great value to the world, but the details of which will interest only the few. It gives a little more prominence to the man whose investigations touch and interest the general farmer and the specialist, too, and to the man who is in touch with many specialists and who is able to give in the briefest possible way a summary of what these specialists have done and what they are trying to do.

The following list of institute speakers, together with the number of institutes attended by each and approximately the number of people addressed by each, may help to make apparent what the institute problem is and how the university people are assisting in solvng it:

Dr. Eugene Davenport, dean of the College of Agriculture and director of the Experiment Station	13 institutes	3500 people
Dr. C. G. Hopkins, head of the Department of Agronomy and Chemistry	13 institutes	3500 people
Crane, F. R., farm mechanics	11 institutes	2350 people
Mosier, J. G., soil physics	9 institutes	850 people
Willis, Clifford, soil physics	8 institutes	850 people
Pettit, J. H., soil fertility	3 institutes	500 people
Hume, A. N., farm crops	3 institutes	600 people
Readhimer, J. E., assistant	6 institutes	550 people
Center, O. D., assistant	7 institutes	1000 people
Oathout, C. H	2 institutes	800 people
Smith, Dr. L. H	10 institutes	1650 people
Total	72 institutes	12650 people
Prof. H. W. Mumford, head of Department of Animal Husbandry	3 institutes	1200 people
Hall, L. D., first assistant	4 institutes	1000 people
Dietrich, William, swine husbandry	5 institutes	400 people
Obrecht, R. C., horses	3 institutes	600 people
Coffey, W. C., sheep	3 institutes	500 people
Total	18 institutes	3700 people
Prof. W. J. Fraser, head of Department of Dairy Husbandry	6 institutes	800 people
Lee, C. E., manufacturers' field work	1 institute	200 people
Hayden, C. C., assistant	2 institutes	300 people
Total	9 institutes	1300 people
Prof. J. C. Blair, head of Department of Horticulture		
Lloyd, J. W., olericulture	1 institute	150 people
Pickett, B. S	3 institutes	350 people
Crandall, C. S., pomology	1 institute	350 people
Total	5 institutes	850 people
Prof. Isabel Bevier, head of Department of Household Science	5 institutes	900 people
Miss Gibbs	3 institutes	550 people
Miss Hunt	5 institutes	1575 people
Mrs. Barlow	29 institutes	4000 people
Total	42 institutes	7025 people
Prof. Fred H. Rankin, head of Department of Agricultural College Extension	19 institutes	4000 people
Barto, D. O., secondary school agriculture	20 institutes	4000 people
Hegnauer, Leonard, assistant	20 institutes	4000 people
Lyles, Rev. C. S., assistant	9 institutes	3400 people
Bill, A. J., assistant	3 institutes	900 people
Dickinson, R. J	3 institutes	350 people
Total	74 institutes	16650 people
Dr. S. A. Forbes, State Entomologist	6 institutes	1000 people
West, James A., assistant	11 institutes	1500 people
Total	17 institutes	2500 people
Grand total number of institutes attended by men and women from the University of Illinois	250 institutes	44675 people

Frank H. Hall, superintendent of institutes	24 institutes	5000 people
Prof. Joseph Carter, assistant	36 institutes	7500 people
Hon. F. G. Blair, superintendent of Public Instruction	7 institutes	4500 people
Prof. U. J. Hoffman, assistant	4 institutes	900 people
Dr. John W. Cook, president Northern Illinois State Normal School, DeKalb	2 institutes	1100 people
Dr. David Felmley, president Illinois State Normal University, Normal	4 institutes	1400 people
Director L. N. Wiggins,* Springfield	1 institute	100 people
Director A. N. Abbott,† Morrison	3 institutes	300 people
President C. W. Farr, Chicago	8 institutes	2275 people
Director J. F. McCartney, Metropolis	9 institutes	2750 people
Mrs. Mina W. Allen, Carbondale	3 institutes	525 people
Supt. Anna L. Barbre, Taylorville	5 institutes	1150 people
Rev. W. H. Mason, Bethany	8 institutes	4100 people
Mr. C. A. Rowe, Jacksonville	2 institutes	400 people
Supt. E. C. Pruitt, Springfield	1 institute	500 people
Mr. E. D. Herbert, Freeport	2 institutes	775 people
Mr. C. D. Smith, Dudley	8 institutes	1200 people
Mr. G. E. Wilson, Princeton	3 institutes	1000 people
Prof. H. G. Russell, Greenfield	5 institutes	2300 people
Mr. Theodore F. Mills, Winslow	2 institutes	350 people
Mrs. H. M. Dunlap, Savoy	12 institutes	7000 people
Mrs. J. J. Southworth, Danville	4 institutes	600 people
Hon. B. F. Staymates, Clinton	4 institutes	700 people
Mrs. Adda P. Wertz, Carbondale	1 institute	600 people
Hon. C. C. Pervier, Sheffield	5 institutes	1000 people
Mr. J. L. Hartwell, Dixon	2 institutes	700 people
Miss Lottie E. Jones, Danville	3 institutes	750 people
Mr. H. A. Winter, Wenona	14 institutes	2900 people
Hon. Fred L. Hatch, Spring Grove	2 institutes	500 people
Mr. Leigh Maxcy, Curran	10 institutes	1650 people
Prof. J. T. Johnson, Macomb Normal	1 institute	500 people
Mr. H. H. Parke, Genoa, Ill	2 institutes	375 people
Mr. J. H. Martin, Morrison	5 institutes	1000 people
Mr. Edward Schneider, Cadiz	3 institutes	340 people
Prof. T. C. Clendenen, Cairo	3 institutes	500 people
Editor A. J. Glover, Ft. Atkinson, Wis	1 institute	1000 people
Supt. J. C. Hoke, Sullivan	5 institutes	950 people
Hon. Israel Mills, Clay City	1 institute	600 people
Prof. W. T. Felts, Carbondale	5 institutes	350 people
Director J. P. Mason, Elgin	4 institutes	1800 people
Miss Agnes Hunt, Ridott	5 institutes	1575 people

SPEAKERS FROM THE STATE HIGHWAY COMMISSION.

Last year there were sixty-seven calls for the expert road maker and bridge builder. Chief Engineer Johnson and his assistants were able to respond to thirty-eight of these calls.

This year there were more calls than counties. While there were a few counties that did not ask for a road and bridge expert, there were several counties that desired the services of such a speaker in two or more places. Woodford county asked for and secured "a road and bridge man" for an address in each of four towns.

In many counties printed copies of the following list of questions were distributed in the audience and the speakers were prepared to answer in a satisfactory manner such of these questions as those present might desire to have discussed.

Questions on Roads and Bridges for Discussion at the Farmers' Institutes.

1907-8.

1. What are regarded as some of the most important reasons why a community should better its roads?
2. What amount do the taxpayers pay yearly for roads and bridges in Illinois?
3. What can a township do to improve its roads without increasing its tax levy?
4. Why has so much attention been given by the State Highway Commisison to the improvements for earth road construction?

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*NOTE—Director Wiggins says: "The subject of my paper was 'City Milk Supply.' It was read before the women's section. I would suggest that this subject and 'Milk, the Greatest of Human Foods,' and 'The Cow as Foster-mother' would be good subjects for discussion at the Domestic Science sessions."

†NOTE—Director Abbott says: "My subject was forestry. Two years ago I could put an audience to sleep with that subject. Last year a little interest was given. This year great interest was manifested by the audience. I think the subject timely. It is becoming a 'live wire.'"

5. What method of maintaining an earth road does the State Highway Commission recommend?
6. What experiments have been made in earth road construction by the State Highway Commission?
7. When is it necessary to use tile underdrains in road construction?
8. What can road associations accomplish? Citing example of Galva Farmers' Road Association of Galva, Henry county, and the Good Roads League of Smithton Township, St. Clair county.
9. Give some facts about the traffic census conducted by the State Highway Commission.
10. Is there any special difficulty in making a macadam or gravel road on a black or clay soil foundation?
11. Why should gravel and macadam roads be made at least twelve feet wide? Is it necessary on country roads to make them wider?
12. Why is it necessary to use rakes in spreading broken stone on a road?
13. Explain how the convicts at the State prisons crush rock? How is it that the crushed rock costs the taxpayers practically nothing? How is this rock distributed?
14. Why is it that so many bridges cost the taxpayers too much?
15. Why should concrete be used throughout for small bridges?
16. What is a reinforced concrete bridge?
17. How can a township plan to construct all of its small bridges of concrete?
18. If a bridge is designed to carry 100 pounds per square foot, as prescribed by law, is it necessarily strong enough to carry a 25 horse power traction engine?
19. Explain what is necessary for supervisors or highway commissioners to do to secure, free of charge, the assistance of the State Highway Commission in preparing plans and estimates for bridges.

Including the chief engineer, A. N. Johnson, six men educated for work as highway engineers took places on the programs of the farmers' institutes during the institute season, as indicated below:

Chief Engineer A. N. Johnson	27 institutes,	5,300 people
Assistant Engineer T. H. McDonald	9 institutes,	750 people
Assistant Engineer C. Older	29 institutes,	4,850 people
Assistant Engineer W. S. Gearheart	9 institutes,	1,425 people
Assistant Engineer C. F. Terhune	23 institutes,	4,538 people
Assistant Engineer H. E. Bilger	7 institutes,	1,126 people
Total	104 institutes,	17,989 people

THE SHORT COURSE AT THE UNIVERSITY.

As was said in our report a year ago: In many ways the institute work is college extension work. Great effort was made by the State institute officers and by the officers of the Domestic Science Association to encourage young people to attend the two weeks' course in agriculture and the course in domestic science at Urbana in January, 1908. The work done by the speakers from the Agricultural College Extension Department of the University was very helpful in making known to the people the facts in regard to the work being done at the college and station, and particularly the attractions offered in the short course.

Although the authorities at the university in former years announced this winter meeting as the "corn growers' and stockmen's convention," we are glad to note that in the announcement for 1908 there are added the words, "and two weeks" course in agriculture."

This change in the announcement will be helpful, since it is much easier to induce young people to attend a school than it is to attract them to a "convention." The increased attendance this year was very gratifying. Last year the enrollment in the agricultural short course was 325. This year it is 552. Moreover, many people attended for a few days who did not register and therefore are not included in the above number.

In the "school for housekeepers," beginning January 21 and continuing four weeks, fifty-three names were registered.

The registration by counties in the agricultural course is given below. It will be observed that seventy-five counties are represented in this registration.

Number Registered in the Two Weeks' Course in Agriculture.

County.	Number.	County.	Number.
Adams	1	**McDonough**	6
Alexander	....	**McHenry**	4
Bond	....	**McLean**	26
Boone	10	**Mason**	4
Bureau	7	**Macon**	9
Brown	5	**Macoupin**	4
Calhoun	....	**Madison**	1
Carroll	1	**Marion**	....
Cass	....	**Marshall**	4
Champaign	101	**Massac**	1
Christian	16	**Menard**	5
Clark	4	**Mercer**	2
Clay	....	**Monroe**	....
Clinton	....	**Montgomery**	3
Coles	4	**Morgan**	7
Cook	5	**Moultrie**	2
Crawford	5	**Ogle**	3
Cumberland	....	**Peoria**	4
DeKalb	10	**Perry**	....
DeWitt	3	**Piatt**	8
Douglas	13	**Pike**	3
DuPage	2	**Pope**	....
Edgar	10	**Pulaski**	....
Edwards	....	**Putnam**	4
Effingham	1	**Randolph**	....
Fayette	4	**Richland**	....
Ford	9	**Rock Island**	9
Fulton	6	**St. Clair**	3
Franklin	....	**Saline**	....
Gallatin	1	**Sangamon**	32
Greene	2	**Schuyler**	2
Grundy	1	**Scott**	5
Hamilton	....	**Shelby**	10
Hancock	7	**Stark**	....
Hardin	....	**Stephenson**	3
Henry	19	**Tazewell**	8
Henderson	3	**Union**	....
Iroquois	7	**Vermilion**	6
Jackson	1	**Wabash**	4
Jasper	....	**Warren**	5
Jefferson	....	**Washington**	....
Jersey	4	**Wayne**	1
Jo Daviess	1	**White**	4
Johnson	....	**Whiteside**	7
Kane	7	**Will**	8
Kankakee	7	**Williamson**	....
Kendall	3	**Winnebago**	16
Knox	5	**Woodford**	8
Lake	3		
LaSalle	10	**Totals**	545
Lawrence	....	**Other states**	7
Lee	1		
Livingston	10		552
Logan	5		

Seventy-five counties represented; 27 counties not represented.

SPECIAL FEATURES IN THE INSTITUTE WORK.

There are at least two points of special interest in the institute work as it has developed this year in the different parts of the State:

I.

County superintendents of schools, city superintendents and teachers, especially those in the rural schools, are devoting more time and effort to the teaching of agriculture and domestic science. Among the county superintendents who are carrying forward this work with much skill and some enthusiasm are: Conn of McHenry, Kern of Winnebago, Doeden of Woodford, Brown of Edgar, Farr of Cook, Lucas of Boone, Grove of Stephenson, Pruitt of Sangamon, Hendricks of Whiteside, Hertel of St. Clair, Ferguson of Rock Island, Hunt of Putnam, McIntosh of Piatt, Stone of Peoria, Gregory of Mercer, Moore of McLean, Spence of Massac, Mehlhop of Mason, Nickols of Logan, Herbert of Livingston, Foster of LaSalle, Simpson of Lake, Boyes of Knox, Curran of Kendall, Dean of Kane, Grissom of Johnson, Williams of Hancock, Cook of Fulton, Morgan of DuPage, Coultas of DeKalb, Green of Crawford, Barbre of Christian, Brown of Bureau, Smith of Adams, Bowman of Macon, Cisne of Wayne.

Hundreds of teachers are entering enthusiastically into the plan of taking into the account in their work of instruction and training the environment of the pupils under their charge. Hundreds of teachers are in active sympathy with the idea that the school instruction must relate itself more closely to the prospective life work of the pupils.

In many instances institute speakers have been invited to address the high schools in the towns in which institutes have been held, and in other instances high school pupils and their teachers have accepted invitations to attend one or more sessions of the institute. By these means thousands of young people have listened to the instruction of some one or more of such men as Dean Davenport, Dr. Hopkins, Professors Rankin, Barto, Hegnauer, President Farr, Professor Russell, Professor Carter and Rev. Lyles. The superintendent of institutes has done some work of this kind and wants more of it.

It is my suggestion that this phase of our work be encouraged; that directors and county institute officers see to it that institute speakers who are known to be skillful in appealing to young people be invited to visit high schools whenever and wherever the opportunity is offered.

I will further suggest that all interested in agricultural education follow the counsel of Director E. W. Burroughs by encouraging their respective county superintendents to provide agricultural instruction for the teachers at the regular summer institutes.

TEACHERS SHOULD BE REQUIRED TO TAKE EXAMINATION IN ELEMENTARY AGRICULTURE.

Illinois, encouraged and assisted by the State university people and by the normal schools, can easily lead in the movement to interest its prospective farmers in the science of agriculture, provided *one change* can be made in the school law. Teachers in this State, as in Nebraska and Wisconsin, should be required to pass examination in the elements of agricultural science, before receiving the permission of the county superintendent of schools to take their places at teachers' desks. This requirement would insure some work on the part of prospective teachers to prepare themselves to teach at least so much of agriculture as is given in the State course of study. That teachers make comparatively little effort to become familiar with this subject under present conditions is shown by the following:

In one of our State normal schools, in the summer of 1906, elementary agriculture was offered as one of the studies for the summer school. The best possible instruction was provided at considerable expense. *Two pupils accepted the instruction offered.* In the summer of 1907 the offer was renewed, with a thoroughly competent man as instructor. *Six pupils accepted the instruction.* There were large numbers in other classes. The reason uniformly assigned for not taking elementary agriculture was that it was not necessary to be proficient in this branch of knowledge in order to get a certificate to teach in Illinois. There have been similar experiences in the other State normal schools.

A few years ago, when Illinois history was made a required subject in examination for certification, this branch immediately came to the front as the most popular study in the teachers' institutes and elsewhere. Place agriculture on the required list, the same to go into effect, say two years from this time, and every teacher in Illinois would welcome the opportunity to join a class in which this subject would be taught by a competent teacher like Professor Barto or Professor Hegnauer.

Regarding the movement to include this subject with those required for certification, State Superintendent Blair, in a letter to the superintendent of institutes, says:

"As soon as adequate preparation has been made for furnishing the teachers with the knowledge and experience necessary for them to take an examination upon the subject of agriculture, I shall be heartily in favor of requiring an examination in that subject by all teachers, especially those who are to teach in the rural schools."

Dr. John W. Cook of the DeKalb normal, says: "I believe that all teachers desiring work in country schools should be required to pass an examination in elementary agriculture. I am not sure whether I would make that universal or not. I am disposed to think that I am headed in that direction. Agriculture is the foundation art of our life and is rapidly becoming scientific. Why should we not study agriculture in all of our schools?"

Dr. Cook further says: "It would be a great stroke to get it on the list of subjects for examination, because we should then have a very efficient but gentle compulsion in the matter."

May I not ask that the State Farmers' Institute, by resolution put itself on record as in favor of this modification of the school law, and that directors and county institute officers write personal letters to the members of the Commission appointed by Gov. Deneen to revise the school law, urging upon them the importance of putting elementary agriculture on the required list?

II.

The second item of especial interest in the institute work as it has developed during the last year has reference to the coöperation of the Farmers' Institute with the State Normal Schools.

The institute held in DeKalb in December last in the Normal School building, was in effect a District Institute. Prominent men from at least six counties were present besides Normal School pupils from nearly every county in Northern Illinois. When it is observed that most of these young people will soon be occupying teachers' desks in their respective counties, the far reaching effect of such an institute is apparent.

Dr. John W. Cook entered heartily into the plan for bringing his teachers and pupils into the scientific, agricultural atmosphere which the institute creates. He attended the sessions, led a large chorus of young men in musical numbers that were highly appreciated, and gave two addresses, one of welcome and the other of encouragememt in the attempted intellectual progress of the farmer.

All of the pupils and teachers attended some of the meetings—all listened to Dean Davenport and to Dr. Hopkins and thus gained some knowledge of the great agricultural uplift that is in progress in Illinois.

County Superintendent Coultas entered no less enthusiastically into this work than did Dr. Cook. As a result of his influence and efforts the rural schools of the county were closed for two of the institute days and 137 teachers enrolled on the 10th and 178 were present on the 11th. A large number of pupils from the country were interested listeners. Many teachers and pupils received instructions in corn judging given by that prince of corn experts, H. A. Winter, and four boys will be sent to the January Short Course at Urbana. Supt Coultas delivered an able address on "Agriculture in the Rural Schools." He reports that he finds many farmers who are interested in this movement and who express themselves as being in favor of the permanent adoption of this subject into the school system of the county.

It is gratifying to know that the next institute will be held at the Normal School building and that Supt. Coultas has been elected as a Director of the County Farmers' Institute for the ensuing year, and this, as Dr. Cook says, "gives us a man in the field all the time."

Prof. C. W. Farr, President of the Illinois Farmers' Institute gave one of his inspiring addresses, subject—"Cows, Corn and Character."

The address of State Supt. Blair was stimulating and helpful and quite in line with his formerly expressed view that "To awaken the mind of a country child, to create in him a more intelligent understanding of and a more wholesome regard for the farm-life, to keep his head in the sunshine of culture and his feet upon the ground of useful knowledge—surely, this is a work worthy of the efforts of the best people."

Excellent addresses were made by Prof. A. J. Glover on "Darying," H. A. Winter on "Corn Growing," and H. H. Parke on "Swine Growing"—and all this in the auditorium of a State Normal School building! Prof. Josephine T. Berry of the Normal School spoke upon "Domestic Science in the Public Schools" and Prof. Jennie E. Farley gave select readings of the highest order.

Hon. B. F. Wyman, Director of Farmers' Institutes for the 12th Congressional District and Secretary of the DeKalb County Institute, is entitled to great credit for bringing together these educational forces—the normal school, the farmers' institute and the rural schools of the county. He reports that the following funds were available for defraying the expenses of the institute:

Board of supervisors appropriated	$150 00
Citizens contributed for premiums	325 00
Sale of exhibits	39 40
State fund	75 00
Total	$589 40

The entertainment features of this institute were for the most part of a very high order of merit and no doubt were an important factor in securing the large attendance. Local favorites like Zaida Brown and Sanford Holcomb helped to pack the house. It is estimated that 1,500 people were present at one session and that not less than 2000 persons enjoyed some part of the institute program.

This is the kind of District Institute to be encouraged. There are places in Illinois for four more like it.

It is an easy possibility to hold five such district institues next year—one at each of the State Normal Schools, DeKalb, Normal, Carbondale, Charleston and Macomb.

Hon. F. G. Blair, State Superintendent of Public Instruction and ex-officio a member of the Farmers' Institute Board, says of this movement:

"You certainly may say that I am in favor of holding such a farmers' institute [as the one held this year at DeKalb] at all the Normal Schools. It will be good for the Normal Schools and good for everybody concerned. The hall can be used free of charge, the students can attend these meetings and catch not a little of the spirit of the farmers' institute from them."

President Bayliss of the Macomb Normal, says: "There is no reason whatever why there should not be just such an institute at this point, except that the farmers' institute work is not so active in this neighborhood as it is in DeKalb county. (I am not sure that this would apply to the whole district.) As far as this school can be a factor in the matter we will undertake to be just as hospitable as Dr. Cook's Normal School or Dr. Felmley's Normal School or any other old Normal School. I would like to have you put us on the list for a district institute next year because I begin to think you will never come over here under any other conditions."

President Parkinson of the Carbondale Normal says: "We shall be pleased to coöperate with the farmers in this section in their efforts to secure better conditions for themselves and their posterity, and shall be glad to arrange with you and Director Easterly for such an institute" [as the one held at DeKalb.]

President Lord of the Charleston Normal says: "I offered the building and any assistance that we might be able to give to the president of the county institute last winter. * * * * * * * The president for the coming year is one of our graduates, also a graduate of the agricultural school, and very enthusiastic. I shall take up the matter with him and we shall be ready to do whatever seems best to him."

President Felmley of the Normal School at Normal.

I have no written word from President Felmley, but he has assured the speaker *viva voce* that he would welcome to his school a District Institute. Dr. Felmley's views on the question of agricultural education are well known to the membership of this body. His face and words appear in two places in our report just published. He is on our Speakers' List and has appeared on the programs of many institutes in Central Illinois and more than once he has been a prominent speaker at our State meetings. We can count on the assistance of Dr. Felmley.

It is already arranged that the DeKalb County Institute for next year will be held in the Normal School building. Parties to this agreement are Dr. Cook, Director Wyman, the county institute officers and the county institute Board of Directors. County Superintendent of Schools Coultas is a member of this Board and as Dr. Cook says, "There will be a man in the field all the year."There is some advantage in arranging for an institute of this kind so early. I will risk the suggestion that directors in the districts in which there are State Normal Schools, Directors J. B. Burrows, Miner, Easterly and S. B. Mason, take up this matter soon with the county officers and the Normal School Presidents and that dates for these institutes be determined upon before the April Conferences are held.

Is Progress Being Made in the Institute Work?

Are the institutes "forging ahead?" Are the interests and attendance increasing or diminishing?

To answer these questions one must look upon the State as a whole. There are localities in which the interest in improved agriculture as judged by the attendance at the institutes, is at a very low ebb. Then there are other localities in which the attendance is measured by the capacity of the hall in which the institute is held. A speaker in two adjoining counties found less than 40 people at one institute and more than 500 at the other. Why this difference? It is not mainly because there is less desire to learn useful things in one county than in the other. It is not that the people in one county are less intelligent than in another. It is not because there is less wealth in one county than in another. It is not because the farmers are busy in one county and not in the adjoining county. The county that "falls down" in the institute work does so from lack of efficient leadership. One man who knows how to do it, can make an institute. After it is made—established on a proper basis, it can stand some opposition, even division into factions and a little neglect. But the great cry all the while is for *leadership*.

There is no service that can be performed by a director, of equal value to that of assisting, when assistance is needed, in the selection of leaders in each county—I might almost say *of a leader*. One good man can do it. Find the man; make him president, or secretary, or chairman of the executive committee, or chairman of the program committee—it matters little which. If he is the right kind of a man the others will coöperate with him and there will be an institute and a good one, too.

I have brief reports this year, not only from directors, but from nearly every institute speaker and a few county superintendents of schools. Taking into the account these reports and my own observation while in the field, I believe I am warranted in the conclusion that there is unabated interest and some progress. In proof of this listen to a few brief extracts from reports that have come into my hands:

Director S. B. Mason says: "Local institutes were held in Leroy and Lexington, McLean county, each of them almost proving a rival for the county institute, in numbers and interest. Both have provided a set of officers and money for institutes next year. The one at Lexington subscribed $125 in a few minutes."

Director McCartney says: "In seven of the counties, Pope, Hardin, Massac' Johnson, Gallatin, Edwards and Hamilton, the interest could not be improved. Every speaker had an appreciative audience and in most places every seat was occupied and standing room was at a premium."

Director Abbott says: "In the whole district there was not an absentee from the regular program—a very exceptional condition. Owing to the distance of this district from the University, the circuit plan of speakers is a particularly happy one."

Director J. B. Burrows reports a good degree of interest in nearly every county in his district.

Director Miner commends especially the work done in Hancock county and gives great credit to County Superintendent Williams. He says: "Something over 600 persons attended the session for boys in Hancock county, and this was considered a very strong feature of the institute."

Delegate—Mr. Chairman, I move that we dispense with the directors' reports, and that they be given in writing.

Delegate—I second the motion.

Chairman Farr—Gentlemen, you have the motion, moved and seconded to dispense with the directors' reports and that they be given in writing. What is you pleasure?

Delegate—Question.

Chairman—Those in favor signify the same by saying aye.

Delegates—Aye.

Chairman—The motion is carried unanimously.

I will ask you gentlemen to stop just a moment while I say a word in regard to the program. I think this program has been pretty generally distributed. There are two periods this afternoon. The first is from 1:30 to 2:45, the second from 3:00 to 4:15. In the first period, from 1:30 to 2:45, there are three sections, as you will see; one on "Horticulture," one on "Corn Improvement," and the last, the third one, on "Insects Injurious to Alfalfa and Clover." For the second period, from 3:00 to 4:15, we have three sections. I am sorry that Director Reynolds, who was to preside at one of the sections in the second period, is not able to be with us. I have asked Director Frake, of the first district, to take his place. Director McCartney is also unable to be here. Director J. B. Burrows, who succeeded Mr. Chester in the nineteenth district, will act as chairman in that meeting. The first meeting in the first section in the first period, and the first meeting in the first section in the second period, that is, those where stereopticon illustrations are used, will meet on the stage platform, instead of the rear platform as the program indicates; and the domestic science people will hold their meetings in the assembly hall in the National hotel, rather than in this room as the program indicates. There are conditions which make these changes necessary.

Now I want to announce the

COMMITTEE ON CREDENTIALS—Directors Ralph Allen, of the 16th District; Ralph W. Chittenden, 10th District; Frank I. Mann, 18th District. The following is the

COMMITTEE ON RESOLUTIONS—Directors A. P. Grout, 20th District; A. N. Abbott, 13th District; A. V. Schermerhorn, 23d District.

Upon motion duly seconded and unanimously carried, it was adopted as a rule of the institute that all resolutions presented shall be first submitted to the committee on resolutions.

Don't forget the meeting of delegates from the odd-numbered congressional districts of this State, to be held in this room at 4:30 for the purpose of electing new institute directors for those districts.

The meeting this evening, being highly educational, the executive committee has thought it wise to ask county superintendent of schools, of Peoria county, U. S. Stone, to preside. Let us adjourn then, until 1:30 o'clock.

Adjourned.

DIRECTORS' REPORTS TO THE SUPERINTENDENT OF INSTITUTES.

REPORT OF MERRILL K. SWEET, GLENWOOD, ILL., DIRECTOR THIRD CONGRESSIONAL DISTRICT.

Report of Farmers' Institute held in Clancy Hall, on the ground of Illinois Manual Training School for Boys, at Glenwood, Cook county, Illinois.

Attendance, 365 boys from 6 to 18 years of age, inmates of the school, about 15 farmers, and a sleigh-load of public school children from Thornton, Ill.

MERRILL K. SWEET.

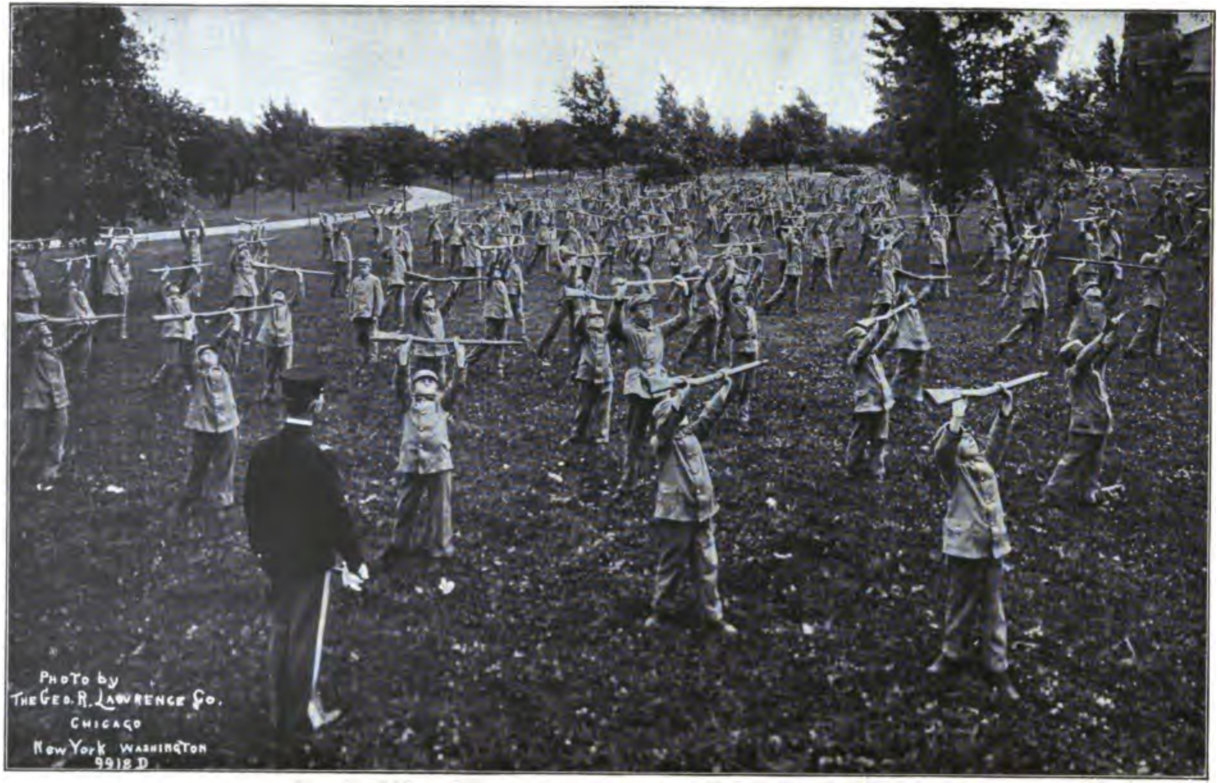
Speakers—Supt. Frank H, Hall, Aurora, Ill; Prof. Crandall, State Agricultural College, Urbana, Ill.; Raymond Johnson, Principal Thornton Public School, and Directors of Illinois Farmers' Institute, B. R. Pierce, C. P. Reynolds, Chas. W. Farr, M. K. Sweet.

Mr. Myron E. Loller, Supt. of Training School, conducted the visitors through the different departments of the institution. It was interesting to see how the boys performed the various tasks which conduced to their cleanliness and well-being.

At noon the visitors were conducted to the spacious dining hall to see the boys march to their seats at the table to partake of the food which is so bountifully provided for them.

The visitors were kindly entertained at dinner by Mr. and Mrs. M. E. Loller.

Boys and visitors then filled the hall, and listened to the address of welcome, by Myron E. Loller, Supt., followed by a song by the boys. Director B. R. Pierce, of Chicago, spoke on the fertility of the soil, and the growing and harvesting of clover.



GLENWOOD SCHOOL.

Mr. Frank H. Hall, of Aurora, gave a talk to the boys.

Prof. Crandall spoke of small fruits.

Mr. Raymond Johnson exhibited corn raised by his school and told his experience.

Prof. C. W. Farr then spread his famous "Cows, Corn, Character" illustration before the boys as long as time would permit.

Meeting adjourned.

REPORT OF JNO. M. CLARK, CHICAGO, DIRECTOR EIGHTH CONGRESSIONAL DISTRICT.

This District comprises a populous section of the city of Chicago, and institute work, such as can be conducted in the outlying districts, is out of the question here.

The one feature of the 8th District, in so far as it applies to the farm and farming interest, is the West Randolph Street vegetable market. This market is one of the sights of Chicago, and no farmer or gardener should fail to get a view of it when visiting the city.

JOHN W. CLARK.

The early morning hours of any week day, from June until November, is the time to see it. It is open for business however, and trading is done upon it every working day in the year, but during the early summer and fall months is when the heavy trade is carried on.

The Market Gardners' and Truck Farmers' Association of Cook County, has prevailed upon the city authorities to enlarge this market, and beginning with 1908, it will be double the size that it has been heretofore.

In the Eighth district, on account of its market, there are more vegetable products disposed of daily, than in any other district of the State.

In my capacity, as Director of the Eighth district, am called upon to furnish numerous copies of the Annual Report Books of the Illinois Farmers' Institute; also Bulletins of the Experiment Station. My acquaintance with the truck farmers of Cook county, owing to the fact that I am in the seed business, makes the Eighth district Directorship important in many ways.

I regret that I shall be unable to attend the Peoria meeting, as business will not permit me to spare the time at this season of the year.

WEST RANDOLPH STREET MARKET.

REPORT OF RALPH W. CHITTENDEN, GURNEE, ILL., DIRECTOR TENTH CONGRESSIONAL DISTRICT.

We held our institute on January 7-8, 1908. We had the best institute that was ever held in Lake county. The attendance was nearly three hundred people at each session. Among our speakers were T. Arthur Simpson, Supt. of Schools, on the "Rural School Problem," which was a very interesting talk; Mr. Arthur T. Gullidge, Principal Gray's Lake High School, on "The Evolution of the Hay-Seed," a very instructive address which was an excellent illustration of the past and future farmer boy; William G. Eckhard, University of Illinois, on "the Fertility of the Soil," which was a fine talk; President Chas. W. Farr, on "Cows, Corn, Character," which was very interesting and instructive; Prof. E. Jack, formerly of Lake Forest University, who pictured out what the rural school can do for agriculture; A. N. Johnson, State Highway Engineer, who explained the best way to make good roads and how to build concrete bridges and culverts, and gave great help to our Supervisors and Commissioners by describing the work of the Highway Commission.

RALPH W. CHITTENDEN.

I think the Farmers' Institute is doing a great deal of good in Lake county. We gave as a prize for the best oration on Farm or Home-making, delivered by any boy or girl, the expenses of attendance at the Short Course at Urbana. Arthur Radcliff won the prize.

REPORT OF J. P. MASON, ELGIN, ILL., DIRECTOR ELEVENTH CONGRESSIONAL DISTRICT.

The institute work in the Eleventh district is in a prosperous condition.

McHenry county held a one-day and evening institute in connection with the teachers of that locality which was a decided success with large attendance and a lively discussion of the topics. By holding a one-day meeting and taking it out to the farmers, I think many of them attended who never did before, or never even knew the character of an institute. They also held a two-day institute about two weeks later with good program and fair attendance.

Kane county held a three-day institute in the northern part of the County for the first time. Many farmers attended who had never done so before and they had an exceptionally good program. The last day was devoted to the schools of the county, Supt. Dean furnishing the speaker for the afternoon and evening—a man from Maine whose addresses were fully appreciated.

Will county's institute of three days was up to its usual high standard with a large attendance. This county has the reputation of holding one of the best institutes in the State.

DuPage county held a very successful three-day institute, with attendance limited only by standing room in the hall, many being turned away.

I am pleased to mention the active interest taken by the County Superintendents of schools in every county in the district, each one doing his share and more toward the success of the institute.

The dairy industry is largely represented in this district. Many of the dairymen are beginning to breed registered dairy stock and are coming to realize the value of a *good cow*, as well as the advantage to be gained from the feeding of balanced rations. This has come about through the influence of our College of Agriculture which many of the young men attend. They are also giving attention to the closer selection and care of seed corn, and the growing of clover and alfalfa, all of which tend to raise the standard of farming to a higher plane.

B. F. WYMAN.

REPORT OF B. F. WYMAN, SYCAMORE, ILL., DIRECTOR TWELFTH CONGRESSIONAL DISTRICT.

The closing of the Farmers' Institute work for the year 1907-8 in the Twelfth district shows the usual good results obtained. Winnebago and Boone counties held two and three one-day institutes, (Winnebago 3) in addition to their usual three-day institutes, and met with most gratifying success. DeKalb county held its institute in the Northern Illinois Normal School building at DeKalb. There were, first, a large auditorium seating about 1500 people, a large gymnasium used for an exhibit of more than 250 entries, a large class-room for boys' corn class, cloak and coat rooms, a dining room—all heated and lighted, with janitor service, telephones, etc. We also had the most efficient assistance of President John W. Cook and his whole staff of assistants and teachers, with the hearty coöperation of the retail merchants' association of DeKalb and the contributions of her citizens, making a condition in institute work that drew from all parts of the county and from five or six surrounding counties. The list of speakers made a combination of agriculture and education that cannot fail to assist very materially in Illinois Farmers' Institute progress.

The next DeKalb county institute will be held in the same place.

LaSalle, Kendall and Grundy counties all held their usual good institutes, but we have not learned of any special features introduced this year.

Having been away from home during and since their institutes, I am not in a position to report more. From observation and the experience of others it would seem that the one-day institutes are highly appreciated wherever held and may become important factors in institute work.

REPORT OF A. N. ABBOTT, MORRISON, ILL., DIRECTOR THIRTEENTH CONGRESSIONAL DISTRICT.

Each of the six counties of this District held a two-days' institute. In addition, JoDaviess held a one-day institute and Whiteside county a two-days' institute.

The attendance at all of the institutes was exceptionally large. The capacity of the halls was tested.

In the whole district there was not an absentee from the regular program, a very exceptional condition.

An exhibit is not necessarily an institute; yet it is worthy of note that where there were the largest exhibits, there were the best institutes.

Owing to the distance of this district from the University, the circuit plan of speakers is a particularly happy one.

A noticeable feature of the institute was the attendance of an unusually large number of young men and actual farmers.

REPORT OF A. W. MINER, ADAIR, ILL., DIRECTOR FOURTEENTH CONGRESSIONAL DISTRICT.

Warren county, rather slack in attendance but attentive audiences.

McDonough about the same in attendance as Warren. Discussions good and profitable to those who took part. Men attending both meetings pledged themselves to create greater interest for next year.

Henderson did not hold an institute.

Mercer, good attendance, appreciative crowds with spirited discussions.

Hancock, very good attendance and a very successful institute. A great deal of credit is due County Superintendent Williams for working up an interest among the boys in his corn contest. Something over 600 persons attended the session for the boys and it was considered a very strong feature in closing the institute.

Rock Island reports the best institute they have ever held. I was unable to attend the meeting owing to sickness in our family.

REPORT OF GEO. W. DEAN, ADAMS, ILL., DIRECTOR FIFTEENTH CONGRESSIONAL DISTRICT.

Early in October Schuyler county held her institute on Tuesday and Wednesday and Knox county held hers on Wednesday and Thursday of the same week. Thus we had to divide the time between them. We were at the Schuyler county institute all of the first day and for the evening session. There was a better audience and more interest manifested than usual. Dean Davenport occupied the evening with one of his masterly talks on agriculture, with a large and appreciative audience. Their report shows good attendance and all their speakers present.

Knox county had a large audience from beginning to end. At noon on the first day, the program being fully carried out, the institute adjourned until evening for the purpose of horse-judging in the afternoon. This was a good lesson. There were horses of all grades and for all purposes. Their entire program was carried out with talent and good effect.

GEORGE W. DEAN.

Fulton, Henry and Adams counties held their institutes when I was unable to attend, but Fulton and Henry sent me their programs to be printed and their reports show speakers all present and large attendance.

Adams county has not reported but the speakers were all present.

REPORT OF S. B. MASON, BLOOMINGTON, ILL., DIRECTOR SEVENTEENTH CONGRESSIONAL DISTRICT.

Yours of the 28th asking for report of institutes held in the Seventeenth district, at hand. You know about Woodford county pretty well. President Leonard and his helpers were an aggressive set of fellows. They took hold of the work in earnest. Institutes were held in El Paso and Eureka; no exhibits were attempted at either place. A special effort was made to reach the young people. The county board appropriated $150 which was divided into premiums for classes in corn judging, bread judging, and elementary agriculture. Instruction was given in the first two only at the last institute of the series at Eureka, but instruction in elementary agriculture was given at all the other towns by Mr. Richard J. Dickinson or Frank H. Hall, superintendent of institutes. Mr. Hall was also invited to address the high school pupils and the students at Eureka College, which proved a very important feature of institute work and one that may well be followed in every town where a speaker is sent who can talk to young people.

At Eureka the lessons in elementary agriculture were given in the high school building and both teachers and pupils gave the closest attention. The lessons as given by that master teacher, Supt. Hall, were so practical and so much above the ordinary lessons of humdrum school life that they created a new interest, and showed at once how important the simple facts of agriculture may be made as a part of the common school curriculum when it is a simple unfolding of the beautiful and useful things in the every day surroundings of the pupils.

County institutes have been held in all the other counties and all of them were successful. Logan had an immense exhibit. No exhibit was attempted in Ford or McLean except that McLean had a series of educational exhibits. The Domestic Science Clubs had a cooking school where meat and vegetables were cooked on two successive days and those in charge answered many questions. A fireless cooker was also in operation.

S. B. MASON.

The institute had exhibits of corn, showing different varieties etc., a cream separater in operation, also a Babcock tester operated by Robert Humphries. A pupil of the Lexington high school, also had an educational exhibit of agricultural text books, and some other exhibits of school work, products of the corn plant, rubber plant, etc., that made a good display.

Pontiac had a good exhibit of corn and poultry. This poultry exhibit was an extraordinarily large one for the occasion, there being 105 birds which the judge scored in the presence of those who wished to listen.

The round table discussions at Pontiac were one of the best things I heard this year. Slips containing printed lists of questions on the topic to be discussed were distributed in the audience, and the questions taken up one by one. The interest was so great that it was difficult to bring it to a close for the next part of the program.

Local institutes were held in Leroy and Lexington, McLean county, each of them almost proving a rival for the county institute in numbers and interest. Both have provided a set of officers and money for institutes next year. The one at Lexington subscribed $125 in a few minutes. Pontiac will also have a local institute next year, the county institute going to Fairbury.

In my opinion these local institutes should be put on the same plane as the county institutes; invited to the district conferences, arrangements for speakers, etc., made as the county institutes.

I have found as before that the Directors' best help is in arranging the programs instead of attending institutes, though both are necessary; but it is the preliminary work that counts. I have had the coöperation of the Superintendents of schools in every county, though not so marked in Ford and we are slowly getting to the place where we should have started at first; in the schools. More and more it is my thought that the scientific side of agriculture must be taught to the boys and girls on the farms if they are to stay there.

Fifty-eight persons were in attendance at the short course from this district, most of them paying their way. The local institutes will take up the young people's contests next year.

List of questions printed and distributed for "round table discussion" at the Pontiac Institute.

Pontiac Farmers' Institute, Jan. 16-17.

1—Will it pay to raise hogs this year?
2—What has caused the recent slump in hog prices?
3—Do fall pigs pay as a rule?
4—Which breed of hogs is it most profitable for the farmer to raise to sell on the general market?
5—Should the hog raiser raise sweet corn for his hogs?
6—To what extent does it pay to sow clover for hogs?
7—Is it best to keep old sows for brood sows?
8—At what age can hogs usually be sold most profitably?
9—What are some of the greatest mistakes made by farmers in caring for their hogs?
10—What of the comparative value of hogs, sheep and cattle in maintaining the fertility of the soil?
11—Do farmers feed young hogs too much?
12—What of chicken-eating hogs?

Report of Frank I. Mann, Gilman, Ill., Director Eighteenth Congressional District.

There is not much to report from the Eighteenth district. Six institutes have been held the past year in the six counties of the district, and as a rule they were better attended and more successful than in previous years. Special efforts were made in each of the counties but one, to get the boys interested by means of corn schools and corn judging contests, and this resulted in a good representation at the two weeks' convention at the Agricultural College. The county institute officers throughout the district are earnest and conscientious in their efforts for better institutes and for an improved agriculture.

Report of J. B. Burrows, Decatur, Ill., Director Nineteenth Congressional District.

Our institute season opened with a two-day session at Windsor, Shelby county, Oct. 23-24. Two University speakers were present and a good program offered but the attendance was light. The interest centered in the corn school with A. A. Hill as instructor and a fair exhibit of corn was made. It seemed a difficult matter here to get the young men to take hold of institute work. They were all too willing to allow Mr. Killam to take the lead and do all the work.

Next comes the Coles county meeting at Charleston, Dec. 17, 18, 19, 20, with four University speakers and an additional corps of talent that drew good audiences. They were fond of entertainment and had no trouble in raising the funds to pay for it.

The same dates were taken by Decatur in Macon county, and the Court House was hardly large enough to hold the crowds. The County Superintendent had begun a year before to encourage the country boys and girls and they made a wonderful showing in a corn exhibit and sewing contest with samples of school work. The exhibit feature of this institute has almost grown out of all proportion and required two secretaries with entry blanks to look after the products. A successful corn school was conducted by Mr. Hill and Mr. Leigh Maxcy and was made a leading feature.

At Strausburg in Shelby county an independent institute was held Jan. 8 and 9, with some local speakers and a corn school under the direction of A. A. Hill. They are inclined to hold a meeting every year at this place and are enthusiastic and full of energy.

At Cerro Gordo, Piatt county, Jan. 9 and 10 occurred a meeting full of interest and good feeling with three University speakers and a good corn school. The main trouble here is to find a hall large enough to hold the crowd.

J. B. BURROWS.

Jan. 16 and 17 Bondville ,in Champaign county brought out a goodly number of interested farmers with four University speakers and a fine exhibit of all classes of farm products. A number here spoke of wanting a meeting every year. Of course they had a corn school with a splendid class of boys.

Farmer City, DeWitt county, followed with three university speakers, a large exhibit and much interest in the meetings; attendance above the average.

Hindsboro in Douglas county attracted large crowds that filled a church to listen to four university speakers. A fine class of boys were istructed in corn by John Clisby or Arcola, and these people insisted that the meeting be held there another year.

Sullivan in Moultrie county occupied the same week with the county superintendent as president of the Moultrie county institute. You may be sure the teachers and scholars of the county schools were in evidence, a large and valuable exhibit in the sumptuous new Court House, with enthusiastic attendance and inspiring addresses, and a corn school under Mr. W. J. Bolin made one of the most successful county meetings we have ever held in the district.

There is to be another Moultrie county meeting at Bethany, Feb. 7 and 8, and another Shelby county meeting later on at Findlay.

REPORT OF EDWARD GRIMES, RAYMOND, ILL., DIRECTOR TWENTY-FIRST CONGRESSIONAL DISTRICT.

Splendid work has been done in each of the four counties of this district. The officers of the farmers' institute in each county are earnest, zealous workers, men well-qualified to be leaders in work among farmers and farmers' boys. In each county they have worked hard to excel and to have a better institute meeting than the preceding year, and I am quite sure they were successful.

A new feature introduced in the work this year (1907-8) was the holding at each institute meeting of an Educational Day. Each day is an educational day, but we set apart one day for teachers and school children having this day's work under the direction and management of the County Superintendent of Schools, with speakers qualified and prepared to interest the teachers present as well as the boys and girls.

EDWARD GRIMES.

This new feature proved a decided success and I feel confident that through the public schools, with county superintendents' assistance, better results can be accomplished not only with the boys and girls but with the farmers, than through all other sources. With the County Superintendent working in harmony with the officers and director, every farmer boy and girl can be brought in touch with this work.

The boy problem and how to solve it is the one great question to be considered by the educators of today. How to interest the boys in their work, to influence them to attend the State Agricultural College and return to the farm rather than drift to the city and be lost among the crowds of idlers and men that are unemployed, is a matter of great interest to every institute officer in the State. Perhaps through their efforts it will be possible to turn the steps of many farm boys away from the city to the College of Agriculture where they are sure to learn *good wholesome* things that will set them *thinking* and *caring more* for the *old farm* and less for city life. Let us see to it that greater efforts be made to keep the boys on the farm.

REPORT OF E. W. BURROUGHS, EDWARDSVILLE, ILL., DIRECTOR TWENTY-SECOND CONGRESSIONAL DISTRICT.

Institutes were held in each of the five counties of this district. In nearly every instance the attendance was excellent and interest commendable. In four of these counties the attendance was better than in former years. In one county there was seemingly insufficient advertising. One of the speakers assigned to this county writes that he "landed" in the town in which the institute was to be held at the hour at which he was to begin to speak. He asked several persons where the institute was to be held before he found one who knew there was an institute in the town.

A special feature of the institute in Madison county is *the parade*. This occupies the entire time of the first forenoon of the institute. It serves as an excellent and effective advertisement. The merchants cheerfully furnish the money and merchandise for premiums. These premium are the largest (or best) loads of oats, wheat, corn, rye, potatoes, hay, children, etc. At the last meeting there were from 50 to 60 loaded wagons in the parade. This is our way of informing everybody in the town and in the country, that something is to be done. This is our way of impressing upon the young people the fact that the *Farmers' Institute* as well as the *Fourth of July* stands for something in which everybody ought to be interested. By means of such advertising and through our reputation for providing a first class program, we secure an attendance limited only by the size of the building in which the institute is held.

E. W. BURROUGHS.

The parade occupies the first half day which in many institutes attracts but few people. Moreover it insures a splendid attendance for the remaining two and one-half days.

WILL M. LECKRONE.

REPORT OF WILL M. LECKRONE, SALEM, ILL., DIRECTOR TWENTY-THIRD CONGRESSIONAL DISTRICT.

A very successful institute was held in each of the ten counties of this district.

One county held a two-day session, the others three days, except the one at Vandalia which lasted four days.

The County Superintendent of Schools co-operated in almost every case, the schools all dismissing for one day and teachers meeting with the farmers.

Each county spent from $50 to $300 for premiums. The daily attendance was unusually large this year.

REPORT OF J. F. McCARTNEY, METROPOLIS, ILL., DIRECTOR TWENTY-FOURTH CONGRESSIONAL DISTRICT.

I beg to report that in the eleven counties constituting the 24th district, county institutes were held in each one from two to three days during the months of October and November, 1907. The writer attended nine of these institutes in person, and addressed the audiences once or twice in each. The dates of institutes in Saline and White counties made his personal attendance at those institutes impracticable. With the exception of the one day institute at Cisne in Wayne county, the attendance was the best ever witnessed in these counties. The institute of that county was divided holding one day each at two points. At the point I did not attend I learn that the attendance was good. In seven of the counties, Pope, Hardin, Massac, Johnson, Gallatin, Edwards and Hamilton, the interest could not be improved. Every speaker had an appreciative hearing and in most places every seat was occupied and standing room was at a premium. In Clay county citizens of Xenia arranged for a carnival on the streets at the same time as the institute and while the attendance in the town was large and in the hall was fair, we were impressed with the fact that Farmers' Institutes should not be put in partnership with street exhibitions. It is a school; and while the school should be made attractive and such devices resorted to as would draw the public, these should not be such as to detract attention from the lessons taught in the school. Hardin county is arranging for a one-day institute in mid-winter. Saline county will also hold another one-day institute about the same time.

J. F. MCCARTNEY.

In most of the counties there were exhibits of farm products, live stock and poultry. Corn and bread judging contests were held. Massac county gave expenses of a boy and girl to the short winter course at Champaign as prizes on corn and bread judging. Take it all in all the writer observed a marked improvement in the work in his district.

REPORT OF H. G. EASTERLY, CARBONDALE, ILL., DIRECTOR TWENTY-FIFTH CONGRESSIONAL DISTRICT.

"Trade increases the wealth and glory of a nation, but its real strength and stamina are to be looked for among the cultivators of the soil."

The institute season opened in this district the third week of August. The weather was extremely rainy during the entire week. The attendance was less than it would have been under more favorable weather conditions. The interest manifested was gratifying to the officers and all who attended were loud in the praise of the excellence of the programs. Jackson, Williamson and Franklin counties were in the August circuit.

In the second circuit the institutes were held during the last week in October. The counties in this circuit were Union, Pulaski and Alexander. One of the important questions discussed was the centralization of schools, and that very naturally led to the discussion of good roads.

The great question of soil fertility is before us at all times; and we are hauling it off in our wagon boxes every year. Our farmers are at last becoming aware of the fact that the best we can do for posterity is to see to it that the land does not deteriorate.

H. G. EASTERLY.

Union county boasts the best and largest Domestic Science Club in the district. This club holds regularly monthly meetings and has an annual basket picnic in "dog days."

Pulaski is always at the front with a first class institute and its officers are to be commended.

Alexander County Farmers' Institute as a social event, was a charming affair; as a source of gratification to every one present, it was a triumph. It was the open confession of several who have attended the institutes in that county since their organization that the meeting at Thebes surpassed everything of the kind in the history of the institute. It was easily in the lead in attendance, interest, enthusiasm and in benefits received. County Superintendent Jno. Snyder of Cairo and President Marchildon, did the handsome thing and deserve the warmest praise for their skill and faithfulness.

The third circuit included Randolph and Perry counties. Randolph county held a two-day session in each of two towns—Red Bud and Coulterville. Both were successful institutes. Perry county closed the work of the district at

Pinckneyville November 22 and 23. The officers and County Superintendent of Schools, Templeton, made this one of the best meetings ever held in the county.

One effect of these institutes has been to blend the scientific and practical and deduct from this something that will promote utility and efficiency in the farming operations in this district.

REPORTS FROM OTHER SOURCES

Concerning Farmers' Institutes and Agricultural Education.

Extract from Letter from State Superintendent of Public Instruction, F. G. Blair, Springfield, Illinois.

*** * * You certainly may say that I am in favor of holding such Farmers' Institutes [as the one held this year at DeKalb] at all the Normal schools. It will be good for the Normal schools and good for everybody concerned.**

HON. F. G. BLAIR.

The hall can be used free of charge, the students can attend these meetings and catch not a little of the spirit of the farmers' institute from them.

*** * * As soon as adequate preparation has been made for furnishing the teachers with the knowledge and experience necessary for them to take an examination upon the subject of agriculture, I shall be heartily in favor of requiring an examination in that subject by all teachers who are to teach in the country schools especially.**

*** * * We had an excellent institute at Wheaton. The only trouble up there is to get a hall big enough to contain the people and I find that that is a growing need especially for the evening meetings of the farmers' institute. At Decatur the Court room did not hold one-half of the people who wanted to get in. When I spoke there in the afternoon the building was crowded, people were standing in the hallways and on the platform so close to the speaker that he could reach out with either hand and touch their heads.**

AGRICULTURE IN THE SCHOOLS OF MCHENRY COUNTY.

(Reported by Supt. G. W. Conn, Jr.)

The work that is being done in agriculture in this county is still "peripheral." Two lines of work are being pursued. The first line has in view the creation of an earnest desire on the part of the school patrons for this work. The second line contemplates the task of qualifying teachers for this important departure in public school work.

Union meetings of teachers and farmers have been in vogue for the past five years in this county with varying degrees of success. The local institutes that have been held during the past year were on the whole the most satisfactory in the history of the movement. One township is *thoroughly* organized, viz.: the township of Riley. They have held three meetings within the last six months and are now planning a fourth. The meetings were all highly successful, and the people in that part of the vineyard are doing some hard thinking along right lines.

Probably one of the most profitable meetings of this nature was one that was held in the village of Alden on December 21st. The upper room of the school building was crowded during the afternoon and evening with farmers and teachers. At the same time the lower room was filled with exhibits of farm products. Premiums were awarded. Borden's Condensing Plant was closed during the afternoon and all employes attended the meeting in a body. J. P. Mason of Elgin talked "dairy" to the audience and for one solid hour he was "pumped" by an inquisitive audience. It was one of the most inspiring meetings that we have ever held.

The Babcock test has been employed in three different schools. It is looked upon with much favor by nearly all patrons of the country school. Several school boards have expressed themselves as being heartily in favor of purchasing a machine as a permanent part of the school equipment. I think it will come but like all good things it will be shipped by freight over the Limited School Tax R. R.

The boys and girls are proving to be the best investments that the stock market of The Agricultural Progress Company has to offer. Last year we sent two boys to the "short term." One of the boys has infected almost the whole community in which he lives with the bacilli of the more "abundant life" on the farm. He assisted at the initial meeting in Riley. He carried on a series of tests at his home and in the neighborhood. He was signally honored by being placed on the program of the State Dairymen's Convention at Marengo. He is still in his senior year in High school. Two boys were sent to the "short term" again this year. However, they were required to agree to the three following conditions: 1. To keep a record of at least one cow in their father's diary for the coming year. This record to be kept on a butter basis. 2. To exhibit one or more products of the farm at the next county fair. 3. To be present at the next annual County Farmers' Institute and make a report of their experiments and records. We believe in giving the boy a chance and then in putting him to work and holding him responsible. It is a valid reason for rejoicing when an "old sinner" is converted and brought into the fold of "efficient living," but progress is insured and victory is ours only when we *start* the *boys* and *girls* on the straight but pleasant path of rational living. If I were to moralize I would say "Don't spend *too* much time with the "old sinners."

AGRICULTURE IN THE SCHOOLS OF SANGAMON COUNTY.

(Reported by Supt. E. C. Pruitt.)

The schools of Sangamon county are doing some things along the lines of agriculture and manual training. Last fall we had a part of the last sessions of the farmers' institute which we called educational day.

A great number of the schools in the county closed and teachers, pupils and parents attended this meeting in large numbers. We had a corn exhibit by the boys, also corn judging; a bread judging contest and a sewing exhibit by the girls. On the whole educational day was quite a success. We will have the same thing next fall, on a much larger scale we hope.

At the fall meeting we want to have the following along with other exhibits: 1. Corn exhibit by the boys. 2. Sewing exhibit by the girls. 3. Manual training exhibit. 4. Picture exhibit (school houses and grounds, etc.) 5. Exhibit of flowers raised in the school yard (pressed or fresh).

I think all of the work for boys and girls at the institute should be held on educational day. We can hardly expect them to attend in large numbers all three days. I am heartily in favor of the schools taking an active part in the farmers' institute and shall at all times assist in this movement.

I am making arrangements to procure a portable stereopticon which can be carried into the country schools and pictures of schools, home, farm, and live stock be shown to the children along with other things. This, I believe, will prove quite an incentive to interest the boy and girl to love the farm and farm life. We want to create a better interest in the farm school.

We are also working to have the different townships offer premiums for the institute, and in that way come in closer contact with a greater number of boys and girls.

A large delegation of Sangamon county boys and girls attended the two-weeks course in agriculture and household science at the College of Agriculture, University of Illinois, which has just closed.

You may count on Sangamon doing her part.

EXTRACTS FROM REPORTS TO THE SUPERINTENDENT MADE BY INSTITUTE SPEAKERS.

(Reported by Speaker————)

You ask for remarks. I have one or two to make relative to the———— county institute. By a special effort I arrived in ———————— before noon the day I was to speak. After carrying my grip to the hotel I found the hall where the meeting was to be held. The janitor was there who had done his duty so far as I could observe. Aside from this excellent janitor, however, no one had made the necessary preparation for an institute. The officers did not arrive until noon. When they did come I found them very intelligent and obliging people; but it seems to me that they made a serious mistake in not getting to the institute earlier. I do not know whether or not any one should be blamed for this delay.

Some institute officers either go themselves or send a delegate to meet speakers at the depot and escort them to the hotel or to the hall where the institute is to be held.

Reported by Speaker H. G. Russell.

I enclose the report you request. I am sure it is correct in every particular unless it be in attendance. I made my own estimate and also took the estimate of others. I was delighted with the interest and attendance at all points except ————. While the interest was fine there, the attendance was not up to my expectation.

It is a great educative work and I would like it very much if I could only reach the young people. It seems to me that something can be done to induce more young people to attend these meetings. They are the ones we need to reach. I do not have much hope of reaching the boys through their parents in matters of life work. We must reach them directly and get them interested in the work before them. We can create ideals for them and shape their work if we can meet them in close contact.

At Mason City I had a fine audience of boys and I think that one of my best meetings. However, I had a fine lot of young people at Jerseyville. They seemed interested to a great degree. Of course, we are reaching a large per cent of the teachers and through them the young people, but that is hardly as satisfactory as reaching them directly. I can interest my own boys to the number of about seventy, and I think I could do the same with others, if I could get at them.

When we can get boys to come to us and tell their plans and ask us how to reach their ideals, we can do something for them, for they would not come if they did not have confidence in us. When we can get boys to settle on their life work early, give them definite instructions in it, and be of practical help to them in reaching success in it, we have done the work. The way to do that is to get into close touch with the boys themselves.

The Grout Encampment proved a great success in these particulars. While the number was not great, the work done is lasting. Such schools will carry education to them, and that is the main thing after all. Many boys have no conception of what there is to learn until they come in contact with such men as the institute is sending out. These men inspire the boys to be somebody and the effort is begun.

I think of publishing a list of questions to boys and having them answer them to me and sending you the answers. If I do, I shall send you the questions before I send them out.

REPORTED BY SPEAKER H. H. PARKE.

The active co-operation of Dr. Jno. W. Cook of the Northern Illinois Normal School and W. W. Coultas, Superintendent of Schools of DeKalb county, with the DeKalb County Farmers' Institute has been of inestimable value in popularizing the work of teaching agriculture in our public schools.

Nine boys between the ages of 16 and 21 years went from DeKalb county to the short course at Urbana, as a result of giving *four* scholarships in our corn judging contest.

The one-day institutes held at Caledonia and Capron in Boone county were "hotbeds" of enthusiasm. There seemed to be a great desire for more light on agricultural topics. These institutes were held at an average expense of $12.50 and the halls were crowded. I believe a one-day institute ought to be held in every township in the county—this in addition to the regular three-day institute.

I must not fail to mention that three of our "short course boys" want to attend the Agricultural College at Urbana, next year.

REPORTED BY SPEAKER EDWARD SCHNEIDER.

In commenting on the institutes attended by me I beg to inform you that ———— county proved almost an absolute failure. * * * * * A little more advertising and some enthusiasm on the part of the officers might bring about a desirable change.

Gallatin county institutes are always big affairs. I am placed on that program nearly every year and I have seen the institute develop from a small meeting composed of a dozen farmers to great gatherings of several hundred. The display of agricultural and domestic products at Ridgeway was immense, distancing the county fair by a whole lot. It will require some care on the part of the officers to prevent the *show* from becoming the *institute* and in a large measure displacing the educational features.

Hardin county is all right if the weather is propitious. It rained on our first day last fall and consequently the attendance was small; but the bright sunshine of the next day brought a good crowd even from distant parts of the county.

We have arranged with the County Superintendent of Schools, Miss Rittenhouse for a combined meeting of teachers and farmers at Elizabethtown in

February. We would like to have had Prof. Barto for that meeting, but unfortunately for Hardin county, he was booked for another place for the date we selected.

REPORTED BY SPEAKER CLAYTON C. PERVIER.

The only points suggested to me in observing the conduct of the institutes which I have attended are lack of advertising and inopportune dates.

I went to one town and inquired at the principal hotel if the institute officers were stopping there and was astonished to learn that the proprietor did not know that an institute was to be held in that town. The attendance showed that there were few who did know it. This condition is a common occurrence where the officers do not reside in the town in which the institute is held.

It is a mistake to hold an institute in November in the "Corn Belt." Farmers simply will not leave the corn field to attend the meetings. I have attended institutes at different times in several counties in the month of November and in every instance the attendance has been a comparative failure ranging from 30 down to 7, at an afternoon meeting in favorable weather·

I attended but one November meeting this year and while the interest was good, the active farmer was conspicuous by his absence.

REPORTED BY SPEAKER D. O. BARTO.

Wherever it was possible I planned to visit the high school before the hour of my institute talk and in nearly every case where I was able to do this, arrangements were made for pupils and teachers to attend later in the day or that evening.

In many cases I think the program is too full. I believe that generally speaking one speaker for each session, allowing time for questions and discussions, makes a more valuable and satisfactory meeting than to crowd more events into it.

GOOD ROADS INSTITUTES.

(Reported by W. G. Curtiss, Secretary JoDaviess County Farmers' Institute.)

Having a small fund on hand at the close of our annual institute, the idea occurred to the writer that we might help the cause of good roads by holding two meetings, one at some town on each of the two principal railroads in the county. The idea was that each town should in the main finance its own meeting using the institute fund in an emergency only. As the matter progressed it developed that five towns instead of two wished to hold good roads institutes, and Chief Engineer Johnson of the State Highway Commission furnished us a speaker for the five meetings at a total cost for expenses of $30.00 to $6.00 per meeting. Other expenses were for hall rent and advertising. The latter was done mainly through small bills, "dodgers"—the most of them being sent out by the rural mail carriers who went out from the five towns where the institutes were to be held. The postmasters at the several towns were of great assistance in making the meetings a success, and they, virtually, had charge of the arrangements for meetings at their respective towns.

Two sessions were held at each place—afternoon and evening. While the attendance was not large it was enthusiastic. Our second meeting was held at Galena in order to reach the Board of Supervisors, and they attended the evening session almost to a member, and were especially interested in the bridge question.

Mr. C. F. Terhune of the State Highway Commission spoke twice daily—on roads in the afternoon and on bridges in the evening. Mr. H. H. Gross of Chicago, representing the office of public roads, Department of Agriculture, Washington, D. C., spoke at the first two meetings. We were disappointed that he could not assist through the entire circuit. Mr. Gross came for expenses only.

We look for much good to come through the missionary work, and also from reaching the Board of Supervisors on the bridge question.

EXTRACT FROM A LETTER FROM DR. JNO. W. COOK.

I believe that all teachers desiring work in country schools should be required to pass an examination in elementary agriculture. I am not sure yet whether I would make that universal or not. I am disposed to think that I am strongly headed in that direction. Agriculture is the foundation art of our life and is rapidly becoming scientific. Why should we not study agriculture in all of our schools?

I am now working on a scheme to have the city here join me in employing a permanent teacher of agriculture. To do that there will have to be a course in the public schools and our Training school, you know, is a part of these schools, and the course of study is determined by the town board.

I am now having our Mr. Charles work himself into the lines of agriculture which he is competent, of course, to do. He is going to take the summer work. I shall advise him to get into touch with the agriculture people at the University. We shall always offer courses in agriculture in our summer school and if I can induce our city board to introduce it into the course of study then we shall have it also in the Training school. We offer it as an elective also in the Normal school so that pupils can take it at any time.

It would be a great stroke to get it on to the list of subjects for examination because we should then have a very efficient but gentle compulsion in the matter. I have my greatest trouble in getting the country boys and girls to take it.

EXTRACT FROM A LETTER FROM J. E. MILLER.

(President Mount Morris College.)

We have this year a class of eight boys and two girls taking the work in Elementary Agriculture. The text is "Agriculture through the Laboratory and School Garden." We find this a splendid book. The text furnishes the basis of the work for one year; but it is supplemented by reports and studies in assigned subjects. Among these are bulletins from the agricultural experiment stations, special texts, etc. We have considerable laboratory work and numerous experiments are conducted by the individual students.

I must also mention the fact that Col. Lowden is furnishing us $100 for prizes for proficiency in certain lines of agriculture. Besides this Dr. D. L. Miller has offered $25 in prizes for the three best essays on flowers and flower culture.

About 50 per cent of our students attended the greater part of the farmers' institute held in Mt. Morris. A number of classes were dismissed so that all could go. Our teachers were very regular in their attendance. All students who wished to go because of their interest, were allowed to be absent from the class even if the class did meet.

Should we be so fortunate as to have the next institute here I am of the opinion that we will dismiss all school work and require all to attend. We will also try to arrange for a series of demonstrations in domestic science and also for some work in corn judging in connection with the institute.

We hope soon to be able to offer second and third year work in agriculture in the college, for I am more and more satisfied that our country boys and girls should have an education to fit them for their work just as much as others of our people for their work. It is just the thing for them.

EXTRACT FROM A LETTER FROM J. E. K. HERRICK.

(Chairman Executive Committee, Sangamon County Institute.)

Previous to this year it had been the custom to take the institute, from year to year, to the villages throughout the county, and we found this course detrimental because it made the institute a purely local affair of the vicinity in which it was held.

It was thought best to hold the institute meeting last fall in the State Armory at Springfield, thus making it available to residents of all parts of the county, Springfield being centrally located and easily accessible by railroads and inter-urban lines from every direction. The change was a success, the institute being the largest and best ever held in the county. We enlarged the executive committee, elected each member of the county board of supervisors as vice-president for his township, appointed for him an assistant and selected a woman in each township to represent the domestic science association.

Mr. E. C. Pruitt, County superintendent of Schools, is an active member of the executive committee and he is doing some great work among the young people of this county along institute lines. Friday the last day of the institute was educational day and there were a thousand teachers and pupils present. The school directors gave the pupils and teachers credit for the day spent at the institute the same as if they had spent it in regular school exercises.

As a partial result of our labors during 1907, we had registered at the Short Course at Urbana in January, 1908, 36 young men and women and these young men and women formed an auxiliary club before leaving Urbana. The purposes of this club are to spread the gospel of improved agriculture, asist in perfecting an organization in every township in the county, promote contests, and offer prizes for skill in various lines of agricultural and home-making industry. The club is composed wholly of young people living upon the farm and they have started out with much enthusiasm. One of the hopeful features of this organization is the manifest determination of the young men and women to go home and do something—carry into practice some of the things they have learned—experiment in feeding, planting, cultivating, caring for implements, or in beautifying the home surroundings, then make a report of their efforts and successes at the next county institute. This idea they originated themselves and we anticipate practical and profitable results.

This county is waking up to the fact that there are great and good things for Sangamon county through the work of the farmers' institute.

I forgot to say that our girls all remained at Urbana for the four weeks' course and many of the boys will remain until April.

Willow Twig not Sprayed.

AFTERNOON OF THE FIRST DAY OF INSTITUTE, FEBRUARY 11, 1908.

STAGE PLATFORM, COLISEUM. 1:30 P. M. TO 2:45 P. M.

H. C. Easterly, Director 25th District, Presiding.

HORTICULTURE.

(Illustrated by Stereopticon.)

Address—Professor C. S. Crandall. (First Slide on Curtain.)

MR. CHAIRMAN, LADIES AND GENTLEMEN—This tree, you will note, is almost entirely bare of foliage. The tree was photographed on the 4th day of October, a few days previous to that date the tree was entirely bare, not a leaf on it. The leaves that now appear have come out, under the influence of a few warm days, from buds that should have remained dormant until spring. The growth from these buds will, of course, be killed by the cold of winter; next season the tree will find it is necessary to develop new buds to supply the deficiency. This extra work of bud formation exhausts energy that should go into fruit production, the crop is diminished both in quantity and quality and the tree is likely to return a loss rather than a profit.

The normal leaves of the season dropped from this tree early in September because of the attack of a parasite fungus for the control of which nothing was done.

Now look at this next tree which as you see has very perfect foliage. The two trees stand not far apart in the same orchard and the two were photographed on the same day.

Delegate—Q. Is that the same variety?

Yes—The trees are of the same variety, Willow Twig. This tree with its perfect foliage was sprayed four times during the summer, and the fungus was completely held in check. The leaves will continue their work to the end of the season and vigorous buds for next season will result.

There can be no question as to which tree will do the best work next season, and the contrast offers a good illustration of the advantages of attention to the matter of spraying.

Here is another illustration taken on the same day in the same orchard: It is taken on the line between sprayed and unsprayed portions. On the left are the sprayed trees, all in perfect foliage; on the right the trees that have not been sprayed, all bare of foliage.

Delegate—Q., What is the cause of that difference in loss of foliage; is it due to rust?

No, sir—The fungi causing the defoliation of these trees do not belong to the group commonly known as rust fungi. There are two fungi concerned in this destructive work, namely, Apply Scab and Fruit Blotch. Both fungi

Willow Twig Sprayed Six Times.

work on both leaves and fruit. In this particular case the Fruit Blotch was most abundant and was responsible for the major share of the injury done. The leaf injury appears in the form of numerous circular brown spots. These spots often coalesce and involve so much of the surface that the leaves die and fall. On the fruit the disease appears as dark brown or black blotches of irregular shape. The affected areas cease growth, become dry and soon crack open. Apples thus affected soon fall to the ground and are worthless.

Q. What is that sprayed with?

It is sprayed with Bordeaux mixture and Paris green.

We now come to another set of slides showing some of the trees in an orchard near Flora, where the station is conducting some experiments with fertilizers. The station is using about 13½ acres in an 80 acre orchard, and there is very wonderful difference between the treated plat trees and the balance of the orchard, which is entirely neglected. The view before you shows in the foreground one of the trees of plat 5 and just beyond are the neglected trees adjoining the plat. Note how perfect the foliage is on the plat tree and how bare of leaves are the trees beyond.

I may say that for the season of 1906 there were barreled 868 barrels of very excellent fruit from the treated plats, while the balance of the 80 acre orchard yielded about 51 barrels of very poor fruit.

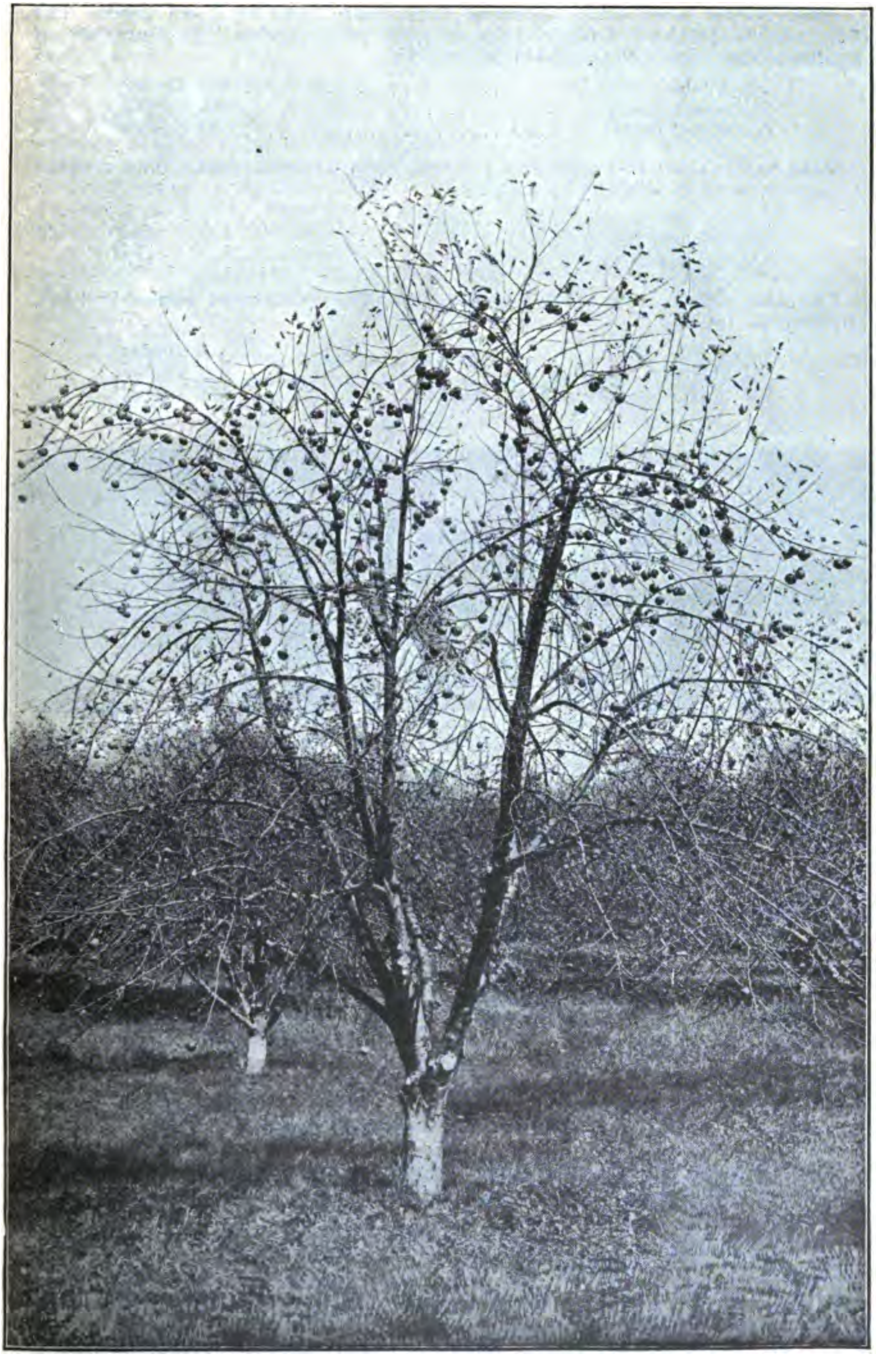
Delegate—Is that due entirely to the treatment of the soil?

No—Not entirely. There are factors other than the application of fertilizers that had much to do with the results. I will explain. All plats under treatment are sprayed each year. They are given three applications of Bordeaux mixture and Paris green the same treatment that is used in well cared for commercial orchards. In addition they are cultivated, except that one plat is left without cultivation to serve as a check on the others. Then fertilizers of different kinds are applied to the different plats. The experiment has not been conducted long enough to warrant definite statements in regard to the relative value of the fertilizers applied, except that it can be said that the plat treated with stable manure shows very marked results from that treatment; the trees are making more growth, they have more dense foliage, and the leaves are darker green than upon surrounding plats. In fruit production there is little difference. The plats treated with different commercial fertilizers do not show marked differences as yet. There are, however, very marked differences between the plats treated differently in the matter of cultivation; the cultivated plats give very much better returns than do the uncultivated. So great is the difference that we are inclined to credit cultivation with a major share of the credit for the good results obtained.

We have here a view looking north between the rows of the plat treated with stable manure. This was taken on the 14th of April when the trees were in full bloom. Note the piles of manure ready for spreading. This manure is weighed out for each tree and is then spread as evenly as possible over the square, in the center of which stands the tree.

Now we pass to a series of slides showing some of the results obtained in experiments regarding the relative merits of liquid and dust sprays. This tree from a plat sprayed with liquid Bordeaux has retained its foliage perfectly. The next, from a plat dusted with dry Bordeaux, has lost practically all its leaves; and the next, from a plat not sprayed at all, is in no way different from the dust sprayed tree. The differences in quality of fruit were equally striking. The trees sprayed with liquid yielded full measure of marketable fruit. On the dust sprayed and check trees the fungi previously referred to had attacked the fruit to such extent that none of it was marketable. The point is that the dust applications did not prevent the development of these injurious fungi, while the liquid applications did. These experiments extended over three seasons and were carried on in three different localities. The results were in each case the same.

Tree No. 7 of Plat No. 13—Sprayed with Dust.



Tree No. 10 of Plat No. 11.—Check, no spray.

Now, follow three slides showing fruit from some of these trees. The first shows the fruit from a tree sprayed with liquids. The number of apples picked was 1,009, divided as follows:

3¼ bushels No. 1	440 apples
3 bushels No. 2	488 apples
½ bushel culls	81 apples

This next shows the fruit from a tree sprayed with dust. The number of apples is 1,102, divided as follows:

5 only No. 1	5
4½ bushels No. 2	682
1½ bushel culls	415

The next shows fruit from a check tree. The number of apples is 1,049, divided as follows:

0 No. 1	0 apples
1½ bushels No. 2	308 apples
2½ bushels culls	741 apples

Representative Apples from Check Trees, Dust Sprayed, and Liquid Sprayed Plats. Sawdon Orchard, Griggsville, 1904.

The next slide is from a photograph of samples of the fruit from liquids sprayed, dust sprayed and check trees, selected by a party of disinterested persons, who visited the orchard to inspect the work in progress. On the right are the liquid sprayed apples, in the center the dust sprayed and on the left the apples from a check tree. The apples were counted and examined, with results as shown in the following tabulation:

Treatment.	Number of apples.	Punctured by Curculio.	Codling moth.	Other insect injury.	Apple scab.	Perfect apples.
Liquid spray	50	14	....	1	35	8
Dust spray	132	103	1	3	131	....
Check—no spray	111	108	6	24	111	....

Now, we will have a few slides illustrating the manner of harnessing up young apple trees used in experiments relating to foliage injury by spray materials.

In the application of Bordeaux mixture and other sprays the foliage of trees is sometimes seriously injured.

We are trying to find the causes of these injuries, in order that means may be devised to prevent them. Two kinds of injuries are recognized: First, brown spotting; circular brown dead spots appear on the leaves; often so numerous and of such size that the living leaf surface is greatly reduced. Second, a yellowing and falling of leaves; leaves become pale, then yellow, and within a day or two fall to the ground. The station has undertaken an investigation of these troubles, and from the work thus far done it seems likely that we must continue for three or four seasons before definite conclusions can be reached. The problem is a difficult one, involving several factors. We suppose the injuries to be due to soluble copper compounds and to soluble arsenic, but supposition is one thing and absolute proof is another thing. If we establish as a fact that injury results from these compounds there still remains the problem of how the action takes place, and this is, possibly, a still more difficult problem.

In order to present this study intelligently it is essential that we know exactly what compounds are formed in the making of Bordeaux mixture. We must know also what changes take place in these compounds after deposition upon the leaves, the nature of the changes, when they begin and how rapidly they progress. The changes occurring must be correlated with observed injuries, with atmospheric and other surrounding conditions that may be suspected of influence in bringing about the results observed. The problems are largely chemical; they deal with obscure processes and their solution requires time and infinite patience. The trees shown in these pictures are a part of the twenty-eight trees used last season in attempting to answer some of the questions regarding the action of Bordeaux mixture. Each tree, after being thoroughly sprayed, is fitted with a funnel in such manner that all water dripping over the leaves can be caught and preserved for analysis. Some of the trees were left exposed to the weather and each lot of rain water collected was analyzed for soluble copper, insoluble copper, lime and arsenic. Other trees are provided with covers to protect them from all rain and dew. These were artificially sprayed at stated intervals with various liquids and the drip waters caught and examined in the same manner as the drip from natural rains. Some very striking results were obtained during last season, and it is expected that when the analyses are completed and correlated with the field notes that some of the many perplexing questions will be definitely answered.

At this point I will stop and give Professor Lloyd opportunity to present other phases of station work.

SOME OTHER LINES OF HORTICULTURAL INVESTIGATION.

(By John W. Lloyd, University of Illinois.)

Professor Crandall has told you about several lines of investigational work conducted by the Department of Horticulture, and has dwelt especially upon the phases of the work which deal primarily with problems connected with the care and management of orchard fruits. I will now call your attention to one additional line of orchard work, and then proceed to outline the work which has been undertaken in reference to various phases of vegetable gardening.

Spraying for the Codling Moth.

Studies in reference to spraying for the codling moth were carried on by the Illinois Agricultural Experiment Station for five years, and the results were published in Bulletin No. 114 in the spring of 1907. It is generally conceded that to be effective against the codling moth, the first application of spraying material following the falling of the petals must be made before the calyxes close. Systematic observations regarding the development of apple blossoms showed that there is considerable difference in the time of opening of the different blossoms in the same cluster. The central blossom may open from a few hours to three or four days ahead of any of the others. This relative forwardness, especially if marked, is usually maintained, so that the earliest blossom to open loses its petals first, and the calyx of the young apple developing from it closes before those of the other apples in the cluster. Although several fruits may set in a cluster, many varieties normally mature only one fruit to each cluster. The others usually drop off while quite small. The fruit which usually has the best chance of surviving in the struggle among the individuals of a cluster is the one which develops from the blossom which opened first. It is important, therefore, that the spraying be done before the calyxes of these earliest blossoms close. Under ordinary conditions the entire orchard should be sprayed within seven days from the time that most of the petals have fallen; and sufficient force and apparatus should be available to accomplish this end, even if delays are encountered by reason of rainy weather or unavoidable accidents.

Damaged by the Codling Moth.

An attempt was made to determine the best method of applying the spraying material for controlling the first brood of the codling moth and also to determine the relative efficiency of different numbers of applications. The first season this experiment was tried the best results were obtained by applying a large amount of material through a fine nozzle under high pressure. It was possible to force spraying material into a much larger percentage of the calyx cavities when a large amount than when a small amount was used per tree. As to the number of applications, the best results were secured when two heavy applications, as described above, were followed by two light applications made with the same nozzle and pressure, but with less material, the spraying being stopped before the small drops ran together. Of the fruit picked from a tree sprayed as indicated, only eighty-one hundredths of one per cent was injured by the first brood of the codling moth. The great advantage of thoroughness in applying the spraying material was shown by the fact that even *one* heavy application (made just after the petals fell) resulted in a crop of apples only 4.07 per cent of which was wormy; while one light application, in which only a small amount of material was used, resulted in a crop 13.81 per cent of which was wormy. From the trees left unsprayed as checks an average of 24.64 per cent of the crop was wormy.

When this experiment was repeated the results appeared less markedly in favor of the greater number of applications, or of one heavy, as compared with one light application. However, taking into consideration both seasons' work, it seems evident that the application made just after the falling of the petals should be sufficiently heavy and applied with sufficient force to place considerable spraying material within the calyx cavities of the young apples, and that at least one additional application should be made for the control of the first brood of codling moth.

SPRAYING FOR THE SECOND BROOD.

While spraying for the first brood of the codling moth is a common practice among Illinois apple growers, very few have as yet attempted to control the second brood by spraying, and serious damage often results from the work of this late brood, even in orchards which have been sprayed for the first brood. Investigations regarding the control of the second brood were commenced by the University of Illinois in 1901. Certain trees were sprayed twice in August with a mixture of Paris green and water, and other trees of the same varieties were left unsprayed as checks. All trees in the experiment had received the three usual applications of Bordeaux mixture and Paris green in the spring. The late spraying, even though the applications were not made until after the worms of the second brood were present in large numbers, was effective in saving many apples that would otherwise have been injured. The percentage of wormy apples picked from the sprayed trees was 20.44 and from the unsprayed trees 49.41. In spite of this good showing in respect to the hand picked fruit, the spraying was not entirely satisfactory, for it burned the foliage and caused an excessive dropping of the immature fruits by reason of injury to the stems.

Accordingly an attempt was made in 1902 to find a mixture that would be effective against the codling moth and not injure the foliage or cause the premature dropping of the fruit. Lime was used in connection with the Paris green and arsenate of lead at two different strengths was also tested. Three applications, beginning July 10, were made to certain Grimes Golden trees and five applications to Ben Davis. The percentage of the crop from each tree which dropped before picking was as follows:

	Grimes.	Ben Davis.
1. Paris green, ¼ lb. to 50 gallon, with lime	25.27	35.65
2. Paris green, ½ lb. to 50 gallon, with lime	45.61	47.02
3. Arsenate of lead	17.36	13.26
4. Arsenate of lead, double strength	10.02	15.65
5. Check—not sprayed	35.02	21.03

The arsenate of lead was made by using twelve and one-half ounces of lead acetate and five ounces of soda to fifty gallons of water. In the "double strength" arsenate of lead twice these quantities were used in the same amount of water.

The following table gives the percentages of the hand picked fruit injured by the second brood of the codling moth:

	Grimes.	Ben Davis.
1. Paris green, ¼ lb. to 50 gallon, with lime	17.48	2.02
2. Paris green, ½ lb. to 50 gallon, with lime	12.87	3.10
3. Arsenate of lead	9.26	5.88
4. Arsenatef of lead, double strength	8.30	3.43
5. Check—not sprayed	32.79	37.82

Since the Paris green, especially the stronger mixture, caused such an excessive dropping of the fruit, the relative merits of the different mixtures cannot be determined by a consideration of the hand picked fruit alone. The percentage of the total crop on the trees early in the season which remained uninjured until the harvest furnishes a more reliable basis of comparison. Of the fruits on the trees July 12, the following percentages were picked in the fall as specimens uninjured by the second brood of the codling moth:

	Grimes.	Ben Davis.
1. Paris green, ¼ lb. to 50 gallon, with lime	61.65	63.04
2. Paris green, ½ lb. to 50 gallon, with lime	47.38	51.33
3. Arsenate of lead	74.98	81.63
4. Arsenate of lead, double strength	82.50	81.45
5. Check—not sprayed	45.37	49.09

It will be seen that in both varieties the stronger mixture of Paris green caused so heavy a dropping of sound fruit that there was practically no benefit derived from the spraying. The weaker mixture of Paris green materially increased the percentage of good fruit, but the arsenate of lead plainly gave the best results, mainly because it did not seriously injure the stems of the fruit as did the Paris green, even though used with lime.

The experiment, with slight modifications, was repeated in 1903 and in 1904. A summary of the results for the three seasons is given in the following tables:

Percentage of Hand Picked Crop Injured for Storage by the Codling Moth (Both Broods).

Treatment.	1902	1903	1904	Average.
1. Paris green, ¼ lb. to 50 gallons, with lime	10.28	21.55	53.35	28.39
2.(a) Paris green, ½ lb. to 50 gallons, with lime	8.98	....	....	....
2.(b) Paris green, with Bordeaux mixture	....	19.18	35.10	....
3. Arsenate of lead	8.87	28.57	44.52	27.32
4. Arsenate of lead, double strength	6.83	20.62	31.79	19.74
5. Check—no late spraying	35.94	22.89	68.87	42.56
6. Paris gredn, with dilute Bordeaux	....	....	35.34	....

Percentage of Total Crop Uninjured for Storage by Codling Moth (Both Broods).

Treatment.	1902	1903	1904	Average.
1. Paris green, ¼ lb. to 50 gallon, with lime	61.94	37.86	34.75	44.85
2.(a) Paris green, ½ lb. to 50 gallon, with lime	46.86	....	....	....
2.(b) Paris green, with Bordeaux mixture	....	43.98	51.60	....
3. Arsenate of lead	77.18	27.49	45.42	50.03
4. Arsenate of lead, double strength	81.23	40.69	55.04	68.98
5. Check—no late spraying	45.94	....	21.26	....
6. Paris green, with dilute Bordeaux	....	....	63.38	....

It will be seen that in two years out of the three the benefits derived from the late spraying were very marked, except in the case of too strong a mixture of Paris green, which caused excessive dropping of the immature fruit. The average results for the three years also show a decided advantage in favor of the spraying. Of the different spraying mixtures used each of the three years, the double strength arsenate of lead gave the best average results, though for the two years in which Paris green was used in combination with standard Bordeaux mixture this material gave fully as good average results as the arsenate of lead. Paris green was used in combination with dilute Bordeaux mixture only one year. The net results were slightly superior to those obtained by the use of Paris green with standard Bordeaux, though this difference was probably due to a slight variation in the severity of the attack upon the different trees, rather than to a difference in the real efficiency of the two mixtures.

This work on the codling moth at Urbana, where the insects were abundant, was supplemented by a test conducted on a commercial scale near Quincy in 1906. Unfortunately for the purposes of the experiment, the attack of the codling moth was so slight that even in the case of trees receiving no late spraying whatever an average of only 4.63 per cent of the hand picked fruit was injured. Under these conditions there could be no very marked differences in the results of different treatments.

THE FARMER'S VEGETABLE GARDEN.

In the spring of 1900 one-half acre of well drained black prairie soil upon the grounds of the horticultural department of the University of Illinois was selected as a site for a "farmer's vegetable garden" and was maintained as such through five successive seasons. The object of maintaining this garden was to secure data regarding the cost of such a garden and the value of its products and to demonstrate the feasibility of securing a large assortment and continuous supply of vegetables throughout the year by a proper selection of varieties, timely planting and judicious tillage. The same general plan was followed throughout the five years; but each year such changes were introduced as the experience of preceding years seemed to warrant. Labor saving methods were practiced as far as possible. The garden was laid out in the form of a long rectangle (280.5 feet by 77.65 feet), with the rows extending lengthwise of the area, and for the most part placed sufficiently far apart to admit of horse cultivation. Care was taken to work the ground in spring when it had reached exactly the right degree of dryness so that a seed bed could be prepared without the use of any hand tools whatsoever. The arrangement of the vegetables in the garden was, with few exceptions, in the order of their planting, so that it was possible to harrow the unplanted portion at sufficiently frequent intervals to keep it free from weeds and well supplied with moisture. Furthermore, the early crops which occupied the ground only a part of the season were planted together, so that after their removal the land might be planted to later crops, the cultivation of which would prevent the growth of weeds that might otherwise be allowed to go to seed and increase the labor of hand weeding the next year. In laying out the rows for planting a sled marker was used, by means of which three rows could be marked at a time; and, furthermore, these marks were of just the right depths for the reception of most varieties of small seeds.

Each year an accurate account was kept of all labor involved in the planting and care of the garden, as well as the cost of seeds, etc., so that the cost of the garden for each year could be determined. So far as possible the products of the garden were gathered each day in quantities suited to the requirements of a well regulated household. But sometimes a particular crop with a short period of edibility would yield much more heavily than was expected, and in order to avoid losing the crop it would be necessary to harvest more at a time than one family could possibly use. In all cases an accurate account was kept of everything gathered from the garden. At the end of the season the garden was credited with these products at a fair average retail price.

Farmers Vegetable Garden, University of Illinois.

A summary of the labor for the five years is given in the following table:

Summary of Labor on Farmer's Garden, 1900-1904, by Hours.

	1900	1901	1902	1903	1904
Work with team—					
Hauling and spreading manure	20	9	27	22	25
Plowing, harrowing, etc	7½	11½	6¾	7½	6¼
Banking celery	....	....	....	....	½
Clearing land after crops	....	....	....	....	½
Total team work	27½	20½	33¾	29½	32¼
Work with one horse—					
Fitting land for planting	1½	8	3	1¾	1½
Cultivating	10	14½	15½	11¼	8
Spraying	....	8	2¼	5¾	4¼
Watering celery	....	5½	....	....	....
Total work with one horse	11½	36	20¾	18¾	13¾
Hand labor—					
Spreading manure	....	8	27	....	17½
Planting	31¼	37¼	18½	24	18¼
Hoeing and other hand tillage	43¾	45	....	....	....
Cultivating with wheel hoe	....	....	10¾	5	8
Hand hoeing	....	....	6½	22¾	15¾
Weeding and thinning	23½	6½	6½	6¾	4¾
Fighting insects	6½	12¼	4¾	6½	8
Training tomatoes	6½	9½	9¼	5¾	5
Clearing land after crops	3	5	7¾	5½	3
Hand work on celery	10	5½	5	10½	6¼
Total hand labor	124½	129	96	86¾	86½

All the expenses of the garden, including seeds, insecticides and labor, may be summarized as follows:

Summary of Expenses for the Five Years.

	1900	1901	1902	1903	1904	Average
Seeds and plants	$ 5 45	$ 4 08	$ 4 18	$ 3 66	$ 3 49	$ 4 18
Insecticides	50	1 50	50	1 00	1 00	90
Labor	26 11	29 48	26 28	23 44	23 24	25 71
Total expenses	$32 06	$35 06	$30 96	$28 10	$27 73	$30 78

The table given below shows the value of the products and the net profits for each year, together with the average value and profits for the five years. It will be seen that the average value of the products from the half acre was $105.25 per year and that the average net profits were $74.85 per year.

Summary of Profits from the Half Acre for Five Years.

	1900	1901	1902	1903	1904	Average
Value of products	$83 84	$68 47	$124 31	$112 73	$136 81	$105 23
Total expense	32 06	35 06	30 96	28 10	27 73	30 78
Net profits	$51 78	$33 41	$93 35	$84 63	$111 08	$74 85

A detailed account of this garden is given in Bulletin No. 105 of the Illinois Agricultural Experiment Station.

MELON INVESTIGATIONS.

For the past seven years the Illinois Agricultural Experiment Station has been carrying on investigations in reference to the gem melon industry of the State. From time to time papers bearing on various phases of the subject have been presented at meetings of the horticultural societies, and a bulletin in reference to one important phase of the subject is now in preparation. From the beginning the chief aim in all the investigations has been to discover, and so far as possible control, the factors which influence the quality of the melons. Secondary considerations have been earliness and yield.

Early in the investigations it was definitely determined that the condition of the vine at the time the fruit matures has more influence upon the quality of melons than has any other factor. A vigorous and healthy vine will produce melons of better quality than one which is weak, stunted, diseased or exhausted by previous bearing. Vigorous vines can be produced only where an abundance of available plant food is present. Repeated experiments show that well rotted stable manure should usually form the main bulk of the fertilizer used.

PACKING MUSK MELONS.

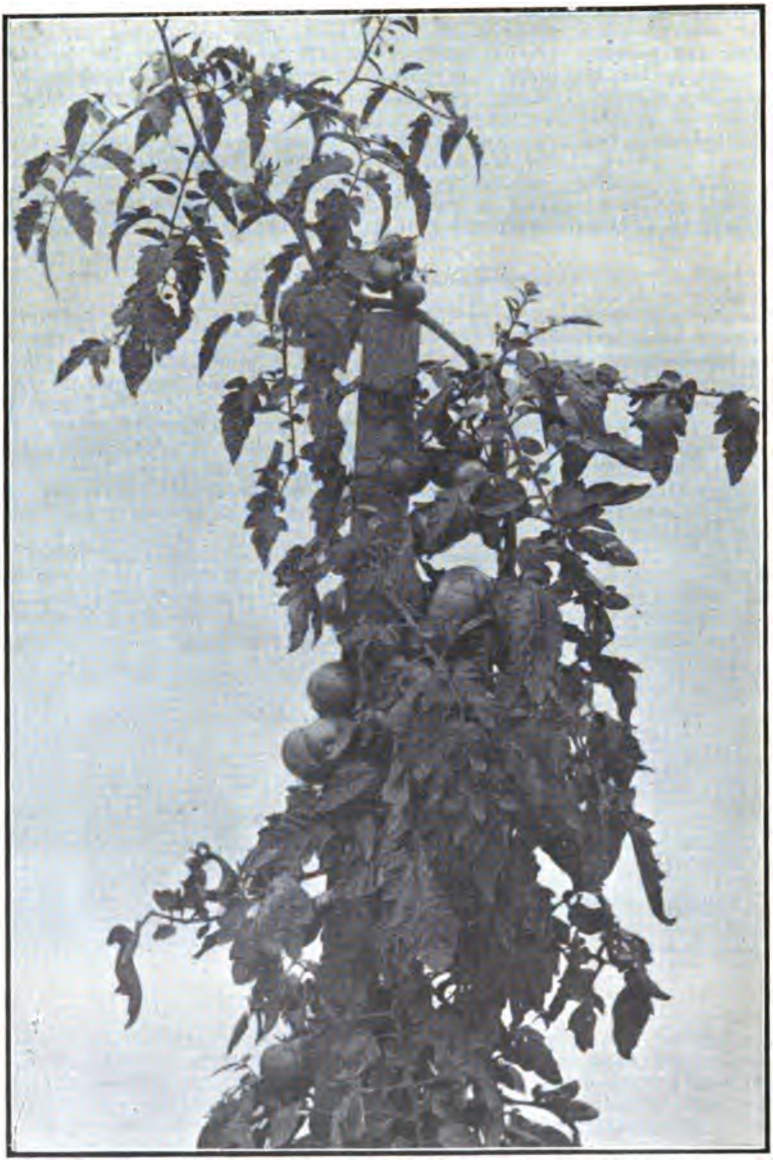
Even if plant food is supplied in abundance and the vines are vigorous and healthy early in the season, the quality of a melon crop may be ruined by an attack of the fungus disease commonly known as "rust." For the last three seasons considerable attention has been given to this disease with a view to devising means for its control. Spraying with Bordeaux mixture has in some instances been quite effective, but repeated applications are necessary and considerable trouble and expense are involved. The latest development in the melon rust situation is the introduction of rust resistant strains of seed. The adaptation of these to this State has not yet been fully determined, but selections are being made in the hope of eventually establishing a strain of melons that will uniformly resist the rust under Illinois conditions.

For several years observations have been made regarding methods of picking and packing melons practiced in this State, and for the last three years the writer has spent much time in melon fields and packing sheds during the shipping season. Studies have also been made regarding the condition of melons when they reach the market and regarding the factors which influence the price and salability of melons shipped to the general market. In short, the whole subject of marketing the muskmelon, including picking, grading, packing, types of packing sheds and the selling of the crop, has been studied in detail. The results of these studies will be published in a bulletin from the Illinois Agricultural Experiment Station.

Tomato Investigations.

For the past three years the Illinois Agricultural Experiment Station has been conducting experiments in reference to the culture of the tomato. The work has been along four distinct lines: (1) A study of conditions affecting the prevalence of the disease known as "wilt," and attempts to control this disease by means of soil treatment; (2) spraying for the control of the leaf spot; (3) fertilizer tests to determine the relative efficiency of various combinations in promoting the development of an early and abundant crop; (4) experiments to determine the relation of various methods of pruning and training to earliness and yield. Considerable progress has been made, but the work will need to be continued for another year or two before definite results can be announced.

Mr. Farr says we have reached the time limit, so I cannot go into details. There are a number of interesting things I might tell you if there was more time. Since there is not, I will say, some other time, may be, I will show you these things again; that is, the rest of them. I don't mean today or tomorrow, but these slides are not as perishable as these melons. I thank you. [Applause.]



TOMATO PRUNED TO A SINGLE STEM.

CORN IMPROVEMENT.

S. B. Mason, Presiding.

(Address of Dr. L. H. Smith, of the University of Illinois).

Ladies and Gentlemen:

It is my privilege to represent your State Agricultural Experiment Station and to bring before you this afternoon some of the different lines of work in which we are engaged in the improvement of corn and which we have represented here in this exhibit.

Now, I have no great oration prepared. What I have to say is in the way of an explanation of this exhibit, so that my speech is mostly in these bottles, pictures, charts and ears of corn which you see before you. As Mr. Mason has suggested, I shall be glad to be interrupted at any time with any questions or comments as they may occur to you, and we will make this session altogether informal.

The improvement of corn is to proceed along three quite distinct lines, namely, better feeding, better breeding and better ear. You will notice that these are the same essential factors that are involved in the successful raising of live stock. In the corn investigations the Experiment Station is working along all three of these lines. It is paying particular attention to the feeding side of the question. And when we speak of feeding we understand, of course, that plants must feed as well as animals, drawing upon the materials of the air and the soil in order to form the substances of their tissues.

S. B. Mason, *Chairman.*

The State Farmers' Institute, as the most of you probably know, has a special interest in this part of the work that has to do with the investigation of the soils of the State, for it is due largely to the efforts of this organization that this most important work was put under way and it is under its general surveillance that it is being carried on.

One of the main features of this investigation is a soil survey of the entire State. Such a general survey is already completed, and the large map which you see as you enter the building gives the locations and boundaries of the principal soil types as they exist in Illinois. It should be understood that this map does not show the different soil areas in any great detail, but only the general prevailing types as they occur in the different sections, and these are represented by the various colors, so you will not expect to always find exactly the particular kind of soil on your farm represented here on this map unless it conforms to the general pre-

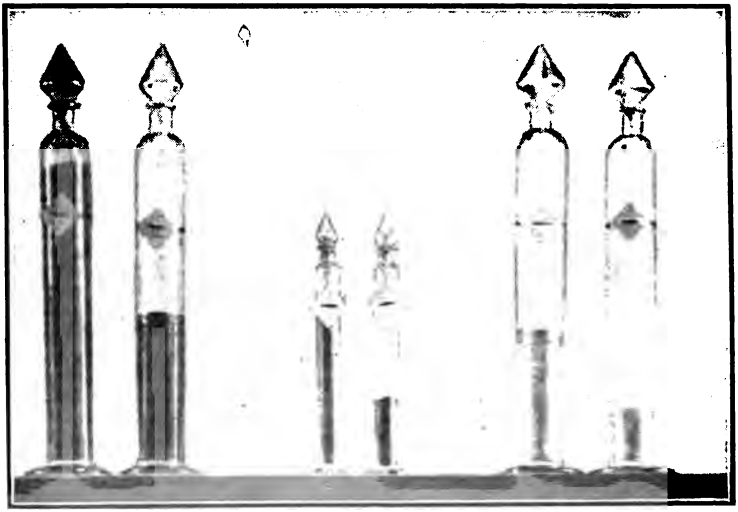
SOIL MAP OF ILLINOIS
FERTILITY IN ILLINOIS SOILS
FERTILITY IN MANURE AND FERTILIZERS
SUGGESTIONS
RULE 1
RULE 2
RULE 3
RULE 4
RULE 5

Dr. L. H. Smith, Explaining the Soil Survey.

vailing type of your district. This general survey, however, is being followed up with a detailed survey, mapping the soils county by county, so that when this is completed we shall be in possession of information concerning every farm in the State. The field work of about thirty counties of this work is already completed.

Field experiments are being conducted on many of these types of soil and they have been studied chemically in the laboratory, so that much has already been learned as to their nature, their present stock of fertility and the methods of maintaining and increasing their productiveness. Bulletin No. 123, giving information in regard to this soil work, is now in press and will be at your disposal shortly.

The next feature of the exhibit to which I wish to call your attention is a series of bottles representing the feeding requirements of the corn plant with respect to the three essential elements of plant food. You know that in connection with soil fertility we have to take into consideration three principal elements, and these are nitrogen, phosphorus and potassium.



Showing the relative amounts of three essential elements of fertility in one bushel of corn and in the stover required to produce the bushel of corn.
Pair of bottles at the left, nitrogen in the form of dried blood.
Pair of bottles in the middle, phosphorus in the form of rock phosphate.
Pair of bottles at the right, potassium in the form of kainit.

Nitrogen in its elementary or natural state is a gas, but it combines with certain other elements, and we have it here in these bottles as one of the constituent elements of dried blood. Now, in one bushel of corn there is one pound of nitrogen, so you see that in the production of every bushel of corn one pound of this element nitrogen is drawn out of the soil, and if it is not there it must be put there or the corn cannot be produced. There is just one pound of nitrogen in the quantity of dried blood shown in this bottle, or sufficient to make one bushel of corn. It requires about half a pound of nitrogen to make the stalks on which the bushel of grain is produced and this amount is represented in the second bottle.

Phosphorus we have here in the form of ground rock phosphate, one of its natural combinations. Phosphorus in its elementary or uncombined state is a dangerous substance to handle, taking fire spontaneously in the air, but combined with the other elements, as we have it here, its properties are quite modified. Those of you who attend Professor Hopkins' lecture tomorrow will hear about these chemical relationships among elements, so I will not stop to explain it further here. This third bottle shows the amount of phosphorus contained in one bushel of corn (0.17 lb.) and the next shows the amount in the stalks required to make the bushel of grain (0.16 lb.). You notice that there is about three times as much phosphorus in the grain as in the stalk.

Potassium, represented in the fifth and sixth bottles, we have here as a constituent of the substance known as kainit. In the case of the potassium there is much more contained in the stover than in the grain, .19 pounds being required for a bushel of grain and .52 pounds for the corresponding stover.

Question by Mr. Mills of Putnam county—I would like to know if in burning the stalks, whether we destroy either of these elements you have shown here.

Answer—In burning the stalks we destroy organic matter and thereby lose our nitrogen. We do not destroy the other two elements, phosphorus and potassium. They remain in the ash.

The next thing I should like to have you notice is the series of corn crates. These represent the yields from some of the soil plots at the University which have been under different systems of soil management for a good many years—in some cases as long as twenty-nine years, and under exact observation and measurement during this time. The yields here are represented on the basis of one one hundredth of an acre.

In the first crate is shown the product of a plot which has been in corn continuously for the past twenty-nine years, with no manure or fertility added. The yield, averaging the last three crops, is now twenty-seven bushels per acre.

Adjoining this plot is another which has been in a two-year rotation of corn alternating with oats during these twenty-nine years. The yield here is forty-six bushels per acre. Next to this comes a third plot with a rotation of corn, oats and clover, and the corn is now yielding on this land at the rate of fifty-eight bushels. Just across the road from these three plots is another plot which has been in the same system of crop rotation of corn, oats and clover during the past thirteen years, but previous to that it was sixteen years in pasture. The yield here is sixty-six bushels. The ruinous effect of the continuous cropping without replacing fertility is made apparent when we compare this with the fifty-eight bushel yield from the plot under the same system, but twenty-nine years old instead of thirteen years.

By adding farm manure the yield goes up in a neighboring plot to 81 bushels. In another plot with lime and manure applied this is increased to 85 bushels. And finally with phosphorus in conjunction with manure and lime, the yield is 93 bushels.

Thirty years ago these plots with yields now ranging from 27 to 93 bushels were all in one field of presumably uniform productiveness—a splendid object lesson showing what can be accomplished by soil management, or mismanagement.

Question by Mr. Moody, Hanna City—I would like to ask whether the clover used in the rotation was taken from the land or was it all turned under?

Answer—One hay crop was taken off, then the second growth was turned under.

We will now turn our attention for a few minutes to the other line of work—that is the improvement of corn by breeding.

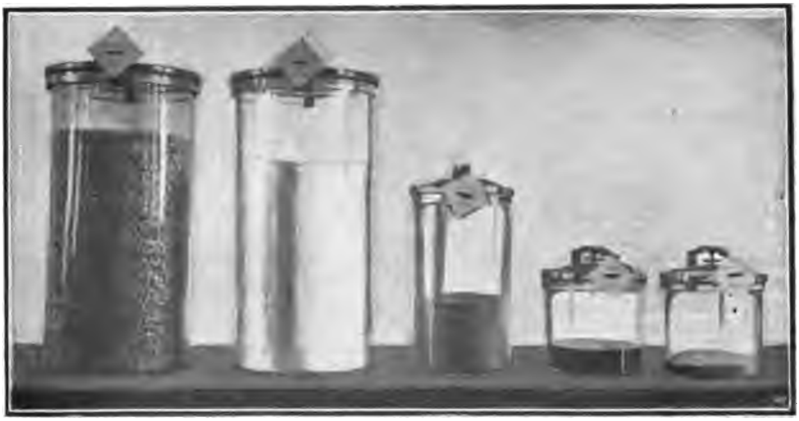
Among other investigations in corn breeding the Experiment Station has been carrying on experiments for eleven years with the purpose in view of changing the composition of the kernel and thus to adapt it to various particular purposes, either for feeding or for manufacturing. You who are feeders know very well that ordinary corn does not contain sufficient protein for most purposes and you have to buy bran or gluten meal or other concentrates in order to reinforce it in this substance, or in other words to balance up the ration. And so it would seem that for feeding purposes it would be of advantage to produce a corn richer in protein.

On the other hand, in the manufacture of many of the corn products such as starch, gums, dextrin and alcohol, protein is only a by-product and starch is the material in demand. A low percentage of protein means a high percentage of starch, and so we find a practical use of a low protein in the industries.

The oil of corn has in recent years become a very important product in the market. It has various uses, the principle one being found in the manufacture of fine grades of soap.

A practical object for the creation of a low oil corn would be found in the production of a finer quality of pork. The oil in corn tends to produce a soft flabby quality of flesh which is especially undesirable for our export trade and a remedy for this defect would lie in a reduction of the oil content of the corn fed to the hog.

Thus we see that aside from scientific interest there is also an economic importance attached to the breeding of these various kinds of corn of different composition. Accordingly, eleven years ago the Experiment Station started some experiments to see what could be done in the way of altering the composition of corn by selecting and breeding. A variety of corn known as Burr's White was chosen which at that time was of the following composition, and I might say that this may be taken as representing about the average of the ordinary corn.



56 lbs.	45 lbs.	6 lbs.	2⅝ lbs.	¾ lbs.
Corn.	Carbohydrates.	Protein.	Oil.	Ash.

Commercial Composition of Corn.

Protein	10.92 per cent
Oil	4.70 per cent
Ash	1.43 per cent
Crude fiber	2.60 per cent
Carbohydrates	80.35 per cent

We have the composition represented here in this series of jars. In the first large jar there is one bushel of shelled corn, 56 pounds, and in the others are represented the amounts of the various constituents which make up the substance of that bushel of corn. There are 45 pounds of carbohydrates which is almost pure starch. In ordinary corn there is about six pounds of protein to the bushel and there is contained two pounds and ten ounces of oil. The amount of mineral matter or ash that would be left after burning is shown here amounting to about three-fourths of a pound. Every time you remove one bushel of corn from your soil, you carry away that much of its fertility. Of course in the burning the nitrogen is lost but we have remaining in this ash the other two of these three important elements, the phosphorus and the potassium.

Question by Mr. J. Simmons—In the sum total of these constituents there is about two pounds short. What became of that?

Answer—In making up the set of jars the one with the small quantity of crude fiber is missing. I may say that these quantities are all reckoned on the dry-substance or water-free basis.

Question by Mr. Lewis—What is the percentage of moisture in ordinary corn?

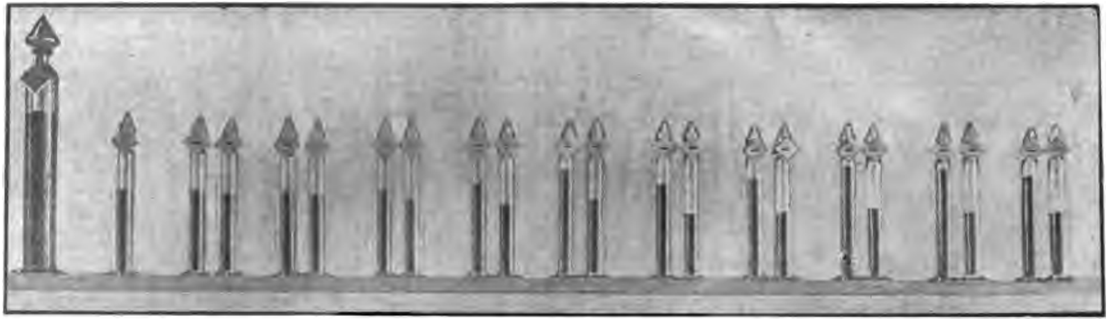
Answer—It varies widely with the conditions but after it has become apparently dry there may still remain 10 or 15 per cent of moisture. On the average it would be perhaps about 12 per cent.

We will now see what results have been accomplished by ten years breeding for increase and decrease of protein content. They are summarized in the accompanying table:

Increase and Decrease of Protein.

Year.	High protein plot average per cent in crop harvested	Low protein plot average per cent in crop harvested	Difference between crops—per cent.
1896	10.92	10.02	0.00
1897	11.10	10.55	0.55
1898	11.05	10.55	0.50
1899	11.46	9.86	1.60
1900	12.32	9.34	2.98
1901	14.12	10.04	4.08
1902	12,34	8.22	4.12
1903	13.04	8.62	4.42
1904	15.03	9.27	5.76
1905	14.72	8.57	6.15
1906	14.26	8.64	5.62

These same results are shown graphically in the bottles. In this case we have our quantities based upon one-tenth of a bushel and in the large bottle there is one-tenth bushel of corn. The amount of protein in this quantity of corn of the two strains is shown so that we may compare the high protein crop with the low protein crop each generation. Beginning on the right with the crop of 1896 and following it along through the ten generations we find comparatively little difference in the first two or three years. It seems to require a few years to get under good headway but as we follow along the series we find that the difference between the high and the low gradually increases until after ten generations the high strain contains almost double the amount of protein as the low strain. In other words, starting with a single variety we have been able by ten years of breeding to produce two kinds of corn, the one of which is almost twice as rich in feeding value as the other.



CORN BREEDING FOR HIGH AND LOW PROTEIN.

This series of specimens represents the progress of the work of the Illinois Experiment Station in the breeding of corn for the increase and decrease of protein through ten generations. In each bottle is represented the amount of protein contained in 1-10 of a bushel of corn of the crop produced. The bottles are so arranged that the crops of the high protein and the low protein breeding plots of each season are represented side by side for comparison.

No less striking have been the results accomplished with the breeding to influence the oil content as the accompanying table shows:

Increase and Decrease of Oil.

Year.	High oil plot average per cent in crop harvested	Low oil plot average per cent in crop harvested	Difference between crops—per cent.
1896	4.70	4.70	0.00
1897	4.73	4.06	0.67
1898	5.15	3.99	1.16
1899	5.64	3.82	1.82
1900	6.12	3.57	2.55
1901	6.09	3.43	2.66
1902	6.41	3.02	3.39
1903	6.50	2.97	3.53
1904	6.97	2.89	4.08
1905	7.29	2.58	4.71
1906	7.37	2.66	4.71

This again is illustrated by the bottles according to the same arrangement as just explained in connection with the protein breeding.

Starting on the left the amount of oil is shown in the crop of 1896 with 4.7 per cent, and following along through the series we notice how the oil increases or decreases in response to the selection, and how the difference between the two strains is constantly widening until finally after ten generations we have in the crop of 1906 about three times as much oil in a bushel of high oil corn as in the low oil strain. That is to say that by selection and breeding we have produced from a single variety of corn two kinds, the one of which is about three times as rich in oil as the other.

Question by a delegate—Do you know the proportion that the protein was increased or reduced as you increased or reduced the oil in the corn?

Answer—We find that the protein follows the oil somewhat; that is, if you increase the oil the percentage of protein is raised a little and vice versa. I do not have the figures at hand but we have them on record which show exactly how much this effect has been.

Question by Mr. Lang of Will county—Do you find that it makes any difference in the practical yield per acre in changing the composition of the corn?

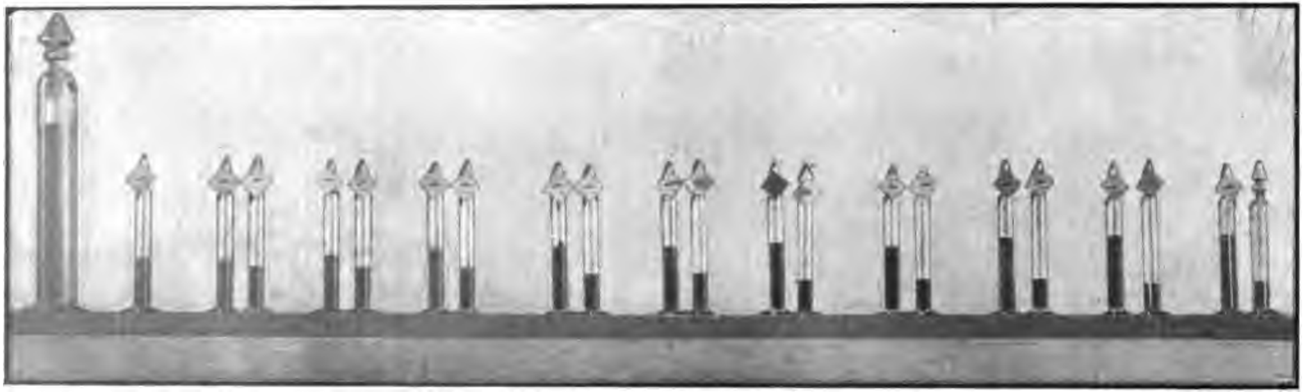
Answer—Yes, sir. Where we have tested these different strains of corn the high protein has yielded somewhat less than the other strains, so it seems that high protein goes together with a reduction of total quantity. But if we figure it out on the basis of production of protein substance per acre we find that there is a considerable gain for the high protein strain. In spite of its smaller yield it gives now about 50 pounds more protein per acre than average corn, or about 10 per cent of the total quantity of protein. I presume from the standpoint of feeding that this would not be an unfair basis of comparison.

Question by Mr. Wells of Douglas county—In raising corn for market and also raising it on the farm to feed, there may be a difference in the species of corn. What species does this represent?

Answer—We started with a variety then known as Burr's White, not one of the largest or best yielding varieties for this State, but one that would be very likely to safely mature, so that we would not be likely to lose a crop through early frost.

Question—You don't have experiments for the various kinds of corn?

Answer—A number of the practical corn breeders of the State are coöperating with the Experiment Station, improving their different varieties along these same lines. There are thus representing several varieties, including Leaming, Boone County White and Reid's Yellow Dent. Some of these varie-



CORN BREEDING FOR HIGH AND LOW OIL.

The bottles are so arranged that the crops of the high oil and low oil breeding plots of each season are represented side by side for comparison.

ties are naturally better adapted to certain purposes, as for example we might find that a certain variety is naturally richer in protein to start with than was Burr's White.

Question by Delegate—I would like to ask one more question. Now, from the statements in regard to the breeding of this corn, it occurs to me that in the raising of protein you bring the corn up to a more nearly balanced ration. Is this corn you have gotten after ten years a more nearly balanced ration than it was before?

Answer—Yes, sir.

Question—The point I want to ask you is this: Is the tenth generation of that corn nearer to a balanced ration than the first?

Answer—Yes, sir.

Question—With increase of oil?

Answer—We do not know that increasing the oil will improve the feeding quality of corn.

It is extremely interesting to watch the development of the breeding. You will notice that there has been a constant and ever widening difference between the percentages of the high and low strains representing constant progress up to the last year where we seem to have come to a standstill or even lost a little. The same thing occurs in both the protein and the oil breeding and it is interesting speculating as to whether we may not now have reached our limits.

Question by H. J. Combs—Do seasonal conditions of year affect it any? In these last two years has this had anything to do with it?

Answer—The season does have an effect. Note how that in the crop of 1904 the protein reaches its highest mark and we have not been able to bring it back to that point since.

Question by H. J. Combs—There is no reason for being discouraged in your last two years. Maybe the next few years it would change.

Answer—No, we shall not give it up yet. We will follow it along.

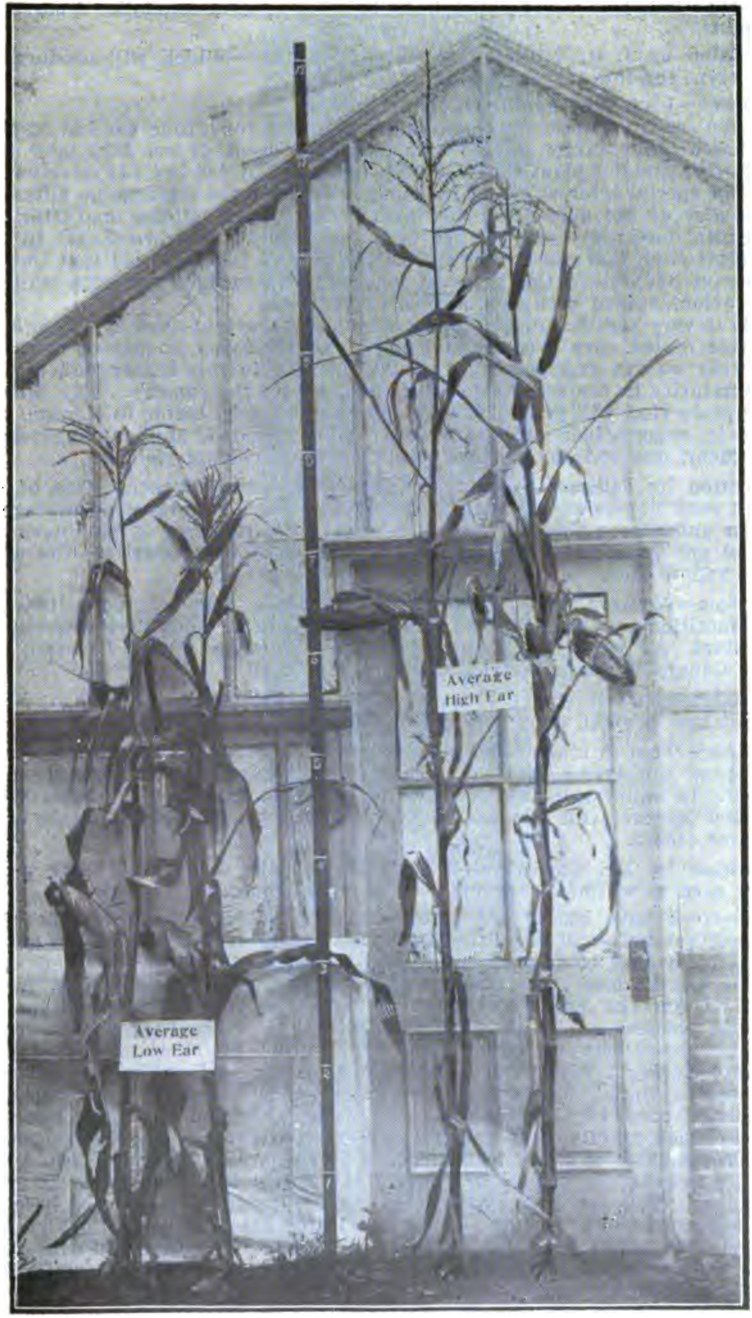
Question by Mr. Rowcliffe—What procedure was used to increase the protein?

Answer—In selecting the seed we analyze a larger number of ears from each crop. We take the samples by shelling off two rows of kernels down the length of the ear. According to the analysis of these samples we select those ears most suited to the purpose in hand. These ears are then planted each in a separate row and each strain in a separate and isolated breeding plot.

Among other experiments in the breeding of corn is an interesting one in which we have been selecting to influence the height at which the ear is borne on the stalk. The experiment was started five years ago when in a general field of Leaming corn, seed was picked from stalks bearing high ears and at the same time from others bearing low ears. These ears were planted in separate breeding plots, a "High Ear Plot" and a "Low Ear Plot," and since then selections have been made each year in these two opposite directions, in the one case to raise the height of ear from the ground and in the other to lower it. The first year there was produced an average difference in the two plots of 13 inches and that difference has been gradually progressing each generation of the selection until now there is an average difference of over three feet as the following table shows:

Height of Ears.

Year.	High ear plot.	Low ear plot.	Difference.
1903	56.4	42.8	13.6
1904	50.2	35.0	15.2
1905	63.2	41.6	21.6
1906	56.3	26.6	29.7
1907	72.3	33.3	39.0



Specimen Stalks From Two Plots—Fifth Generation.

This experiment is represented here by these specimen stalks from these two plots.

Question by J. H. Williams of Marshall county—Which will produce the more corn, the low ear or the high ear?

Answer—I am just coming to that point.

As you see from these specimen plants, selecting for a high ear has resulted in a much taller, larger plant which matures a week or ten days later than the shorter, smaller plant that has been developed by the low ear selection.

But of special interest is the fact that in spite of the remarkable difference in the size of the plant, the yield from the smaller, quicker maturing low ear strain does not seem to have been impaired by this breeding. In fact the result from this past year's test in the variety plots showed that the low ear strain out-yielded the high ear by about six bushels per acre while in the previous season both strains produced alike.

This is very significant, for one of the most important questions before the attention of the corn growers and corn breeders today is that of maturity. This year we are experiencing unusual difficulty in this regard and the cry of immaturity in the crop arises from all parts of the country. The demand is for grain that will grade better in the market, keep better in storage, ship better in exportation, germinate better when planted, and our problem is the difficult one of inducing earliness without sacrificing yield.

Question by delegate—You spoke about the Leaming corn. One of our largest seed buyers says Boone County White has the largest percentage of protein and also matures earlier. I would like to know if you have discovered any great difference in the amount in different varieties—the white or the yellow corn.

Answer—We have not found any great difference. There is more difference in composition between different varieties of the same color than between the two colors. As far as our examinations go, we have not found, however, that Boone County White is the richest in protein or oil.

Question—Isn't it true that in breeding for any particular change, would you not lose in yield, or in some other particular point?

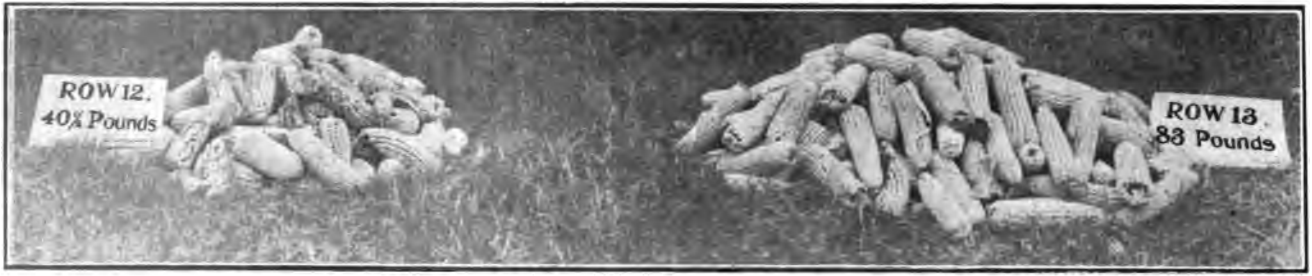
Answer—That is true. These characteristics are not all correlated so that it happens sometimes that the breeder is working in direct opposition to himself. In building up one point we may be breaking down another. When we select intensely for one special characteristic we are very likely to sacrifice some others.

Question by Mr. Goodwine—Why is it that the feeders of stock prefer yellow corn to white? They make quite a difference.

Answer—I have heard that statement very often. I have also heard it reversed, but not so often. I do not know how to explain it. In the human animal the yellow color seems to appeal to our sense of beauty. You know there is a great deal more poetry in the "golden grain" than in just "white corn." I am not prepared, however, to say as to just what extent the aesthetic element enters into the discrimination of the porker when he is given his choice between a yellow and a white ear.

Before closing I wish to bring to your attention just one more feature of the breeding work. We have here an exhibit illustrating the great variation in productiveness of different seed ears. You know you may have two seed ears that look exactly alike as far as all external appearances are concerned, but you put them to a test in a breeding plot where each ear is planted in a separate row and in some cases one of these ears will yield twice as much as another. This occurs very often and in the instance represented here the rows happened to be growing side by side in the breeding plot. Both planted the same day developed under the same conditions of weather and cultivation but at the harvest Row No. 12 produced 40½ pounds of ear corn while Row No. 13 produced 83 pounds.

Question—How are you going to tell the high from the low, when you are picking it?



Planted Same Day. Developed Under Same Conditions.

Answer—That is just the point. You can not tell and right there comes in the tremendous importance of testing it and making it show up a performance record in the field. Mr. C. D. Smith, who is to follow me will bring out especially this point in his discussion.

Question by Mr. Hamlin—Is it not possible that these selected rows producing the most corn have been pollenized from other rows, a thing which will have its effect in the future?

Answer—Certainly. That is something you can not avoid in this system. The principle is, however, that by constantly eliminating this bad blood we shall be able to gradually build up the strain.

Question by J. C. Hoke—Do you know what the crossing of these high ears in the future will do?

Answer—No, I could not tell you.

TWO YEARS WITH A SEED CORN PLOT.

(Mr. C. D. Smith, Dudley, Ill.)

I am glad that Dr. Smith has made his points so plain in his discussion of the improvement of the chemical composition of corn and how this improvement has been made, for it helps to establish the line of thought that I want to take up, "the improvement of the yield of corn." The method that I have followed has been very similar to that of Dr. Smith, but I have only taken up the line of improvement in yield, while he has experimented in both the yield and chemical composition. The improvements in both his experiments and mine have been made through the selection of the seed. He has selected the seed for his experiments from a similar standpoint that I have done; he for the composition of the grain and I for the yield. He selected his seed for the oil or protein content and I selected mine for the power of transmission, the ability to grow larger yields. But the one object has been to improve the corn, he the chemical composition and I the yield, regardless of the composition of the grain.

He has shown that by picking a particular kind of corn for seed he has increased the oil content on the one hand or the protein content on the other hand. So I want to show that the crop yield can be improved through the proper selection of seed, as well as the composition of the grain, for it ought not to be any more difficult to improve the yield by the selection of seed than to change the chemical composition of the grain by that method. If corn is susceptible to influences that will change the chemical composition of the grain it ought also be subject to like influences to increase the yield. So I want to discuss the improvement of corn along that line.

In the first place, this should be begun with some good type of corn. I do not wish to discuss the subject of establishing a certain type or kind of corn, for enough types of corn have already been established. There are types and types that have been bred so long in the "blue" that the type characteristics have been firmly established, so it would be useless for me, in the short time allotted to this subject, to discuss that point.

The point, however, that I do want to permanently fix in your minds is that by the proper selection of seed you can improve the yield of the type of corn you are already growing, and it is not necessary for you to change your corn to make the selection, unless you are growing scrub corn. If you are growing scrub corn, then I would advise you to change your seed. But not many farmers, I hope, are still trying to grow scrub corn, when there are so many varieties of good corn that can be had at a very reasonable price. But I am very sure that even the yield of scrub corn can be very materially increased by the proper selection of seed; but it is a question whether you could bring it up to a point where it would repay you for your trouble, and so I would not fool with it, but buy a good type—the kind that suited me best—and start with it. Select from this a number of the best ears and plant them in a small plot, with the rows not so long but that you can plant each row from a single ear and have enough of it left for reference. Select as many ears as you have rows. Locate the plot so that the soil will be as near alike all over it as possible and give the whole plot the same preparation of the seed bed, the same cultivation throughout the season and let every row have an equal chance with every other row. Plant each row from a single ear and mark each ear so that you can know from which ear each row was planted. Observe the growing of each row, whether it grows strong or weak; whether one row shows more weakness of stalk than others, as evidenced by the stalks falling or blowing down. Keep a record of these observations. Keep a record of the number of stalks in each row, the number of stalks that fell down in each row, the weight of the corn husked from each row and any other records that may tend to show the individuality of the ear. From the corn husked from each row pick out the best ears and mark them so that you can tell the ears of each row. Then from the rows that show the strongest powers of transmission by growing the largest yields select your seed ears for the next year's trial. Discard the weak growing and low yielding rows.

I have one acre in my plot and have tried this plan for two years, and this chart (No. 1) shows the results for the two years. There are forty-three rows, eighty-four hills long. The first year I picked forty-three ears, the best I could find. The second year I picked forty-three ears from the rows that yielded the best the first year, and column five shows the rows from which these ears were taken. The first year I planted the ears as they appeared to merit. Row No. 1 was planted with the best looking ear, row No. 2 with second choice, and so on throughout the plot. The second year they were not planted with any regard to looks, but were planted so that where two or more ears were taken from one row, no two ears from the same row were planted side by side; but where only one ear was used from any one row that row was planted the second year with an ear from that row, with the exception of row No. 29, and a mistake was made in planting it.

When farmers pick their seed corn from the crib or wagon box, each ear is chosen because of its good looks and nothing else. So I want to try and prove by this chart (No. 1) that selecting seed corn that way is the poorest way that a farmer can select it, simply because he knows absolutely nothing about the ears that he selects except that they may be good looking ears. They are chosen because he likes their looks. He may examine the depth of grain, the smallness of cob, the shape of the grain, but how little is that to know when compared with what he should know. About its power to produce a yield he knows nothing, and no more about its ability to transmit its good looks to its offspring, both necessary features in good seed corn. Because an ear is a good looker is no guarantee that it can grow good looking ears. It may do so and it may not. And for the reason that when a farmer selects his seed corn from the crib he judges it by its looks alone, therefore it is a very poor way to select it. The farmer that selects his seed corn from the field while the corn is still on the stalk is following a much better plan, but not the best plan.

If we are ever to come to the point where we can grow the largest yields possible we must adopt a different method of picking our seed corn, and not select it from the crib. We must pick it because of its ability to grow good corn, and not from its looks alone. We must know whether the ears we plant have been grown from a high yielding strain of corn or from a low one. We must know whether its powers of transmission are strong or weak.

To make plainer what I mean, let me use an illustration with which many of you are familiar. Suppose a farmer goes to a breeder of hogs to buy a brood sow, and suppose that after the breeder has shown the farmer a lot of fine looking ones he says to the farmer, "Take your choice." Will that farmer choose one of those sows simply by looking at it. If he does, he is not "on to his job." If he is a wise live stock man, when the breeder says "take your choice," he will not make that choice until he knows the record of those sows—which one of them has the best breeding record behind her, because he knows, that everything else being equal, it makes a great difference how she is bred whether she is likely to make a good breeder. And after he learns the record he will choose the sow that comes from the best family of breeders in preference to one that has not so good a record, but possibly may be a better loooker.

Again, take two cows. Take Rose and Queen of the Agricultural College. What was it that made one of those cows so famous? It was her ability to do things. And do you think that any careful observer could have told the difference between them without having known anything about them? No. He might have guessed at it, as you guess at the ears of corn that you pick from the crib. About the half the time he might hit it and the other half miss it. There is a great difference in brood sows and also a difference in milk cows, and there is just as great difference between ears of corn. Some are good and some are bad. It requires a test to tell the good from the bad.

Let me show you by this chart (No. 1) that this is true. Here are rows No, 21 and No. 22 they grew side by side; were planted the same day, gathered the same day; each had an equal chance with the other, and yet one produced 61 bushels and the other 123 bushels to the acre. Here are parts of the ears, and no man would suspect that there could be that difference between them to look at them. And I can let you examine them and it would be a chance if you guessed the right one. Yet after knowing what these ears have done in the test, you would not plant a grain of No. 21 and would plant all of No. 22, nubs and all. Why? Simply you can see how much corn No. 22 is capable of growing and how small a yield No. 21 grew when it had an equal chance with No. 22. Also take Nos. 36, 37 and 38. Would you have any use for an ear like No. 37 for seed, for it grew between Nos. 36 and 38 and only made a yield of fifty-four bushels to the acre, while they each made a yield of ninety-five bushels to the acre. No, you would not. Why? Simply because you can see that it is weak in the power of transmission; it cannot grow corn like the other two.

Then again, notice Nos. 1, 2 and 34 of 1907. No. 1 weighed 20.5 ounces; No. 2, 15 ounces, and No. 34, 20 ounces. Nos. 1 and 34 are two very large fine ears, both show ears. No. 2 would not meet any of the requirements of the score card except in length. It was not a show ear, yet it was the best yielder of the three ears. No. 34, while a good looker, an ear that any one would choose for seed if he was picking it from the crib, proved to be an ear that was a very weak grower throughout the whole season. At husking time the stalks in this row were from eighteen to twenty-four inches shorter than the stalks in the adjoining rows. And while it made a yield of eighty-six bushels to the acre, which is no small yield, yet with the knowledge that it made such a poor outcome at growing you would not use any of it for seed because of that weakness. And still, No. 1, an equally good looking ear and a fraction heavier than No. 34, was a very strong grower and a good yielder, for it made a yield of 113.5 bushels to the acre, which is a remarkable yield for an outside row. So that we cannot say that all big ears are poor seed ears.

Then notice that No. 2, a fifteen ounce ear, not an extra good looker, but an excellent yielder, made a yield of 132 bushels to the acre. But we must not conclude from this yield that we should pick only fifteen ounce ears for seed, for when we refer to No. 15 of 1907 we find that seed ear weighed just a little less than fifteen ounces, but only made a yield of eighty-nine bushels to the acre. Then also notice No. 25 of 1907. This ear weighed only a fraction over twelve ounces, but made a yield of 116.7 bushels to the acre. And I want to say in regard to this row that it was the nearest to an ideal growing row of corn I ever saw. Almost every stalk in it grew as straight as a plumb. The leaves or blades were broad and a very dark green. It was a remarkably strong grower, and if I could get a strain of corn to grow like it I would not hunt for a stronger growing kind of corn.

So we are forced to come to this conclusion: That the size of the ear or the looks of the ear or the shape of the ear has but very little to do with the yield of corn. For we may get a very high yield from one abnormally large ear and from another one just as large a very small yield. And the same is true of the medium or small ears. And we may get much more corn from an illy shaped ear than from a perfect one. But this fact must not deter us from picking good looking ears, for some of the good looking ears are splendid yielders, but not all of them. Neither are all of the poor looking ears poor yielders. So we must not depend altogether on the size of the ear or the looks of the ear or the shape of the ear, but we must get down to the bottom of the trouble, and that is the breeding of the seed.

After giving this matter a great deal of thought I am thoroughly convinced that this is the remedy; that if we ever reach the highest yields of corn that it is possible for us to grow we must have seed with the right kind of blood in it. We must get that seed from where we can know its breeding, its powers of transmission, its ability to grow corn. And in no other way can we get that kind of seed only by breeding it in plots where we can control the mating and know what each ear is doing.

To show that it is possible to do this, let us refer to chart No. 2. Let us take Nos. 2, 4, 5, 8 and 16. In 1906 row No. 2 yielded ninety-five bushels to the acre and in 1907 132 bushels. And I want to say a word right here about the rows, Nos. 1, 2, 3, 41, 42 and 43. You will notice that there is a big increase in these rows in 1907 over 1906. In 1906, even up to the time I begun to husk the corn in the plot, I did not realize that there was much in growing corn in a plot, and grew it simply as an experiment, and I was not very careful with it. So I cultivated it four times, two times each way, and by turning on the first three and the last three rows, in cultivating it crossways, the horses tramped down a good deal of it, and that accounts for the comparatively small yield in these rows in 1906 and the increased yield in 1907, for in 1907 I gave each row an equal chance with every other row by cultivating the plot only one way; and a good deal of this increased yield in these six rows in 1907 is due to the better stand. But that has but very little to do with what I started out to say.

In 1907 one row was planted from row No. 2 of 1906. From row No. 4 there were four rows planted, Nos. 4, 11, 20 and 25. In 1906 No. 4 yielded 113 bushels to the acre. In 1907 the four rows planted from it yielded an average of 105.5 bushels to the acre, a falling off of eight bushels to the acre. But a good part of this was due to row No. 11, which, for some unknown reason, was a weak grower. But row No. 4 made 119 bushels to the acre.

Then take No. 5. In 1907 two rows were planted from that row, Nos. 5 and 10. In 1906 No. 5 yielded at the rate of ninety-eight bushels. In 1907 the two rows yielded at the rate of 109 bushels.

Then take row No. 8. In 1907 three rows were planted from it, Nos. 6, 8 and 23. In 1906 it yielded eighty-nine bushels to the acre; in 1907 the three rows averaged 110 bushels. Then again, take row No. 16. In 1907 three rows were planted from it, Nos. 14, 16 and 29. In 1906 it yielded at the rate of ninety-two bushels and in 1907 the three rows averaged 106.8 bushels.

So, in these comparisons we find that from the forty-three rows that were planted in 1906 we have at least four of these ears that we can rely on as good breeders, Nos. 2, 5, 8 and 16. Others have done splendidly, but we will use these four in our argument. In 1907 we have nine rows planted from seed from these four ears, and from the corn grown from these nine rows we have 362 seed ears, and the average yield of these nine rows is 111 bushels.

So now, from the product of these four ears planted in 1906 we have practically three and one-half bushels of seed corn that has a record of 111 bushels to the acre. These three and one-half bushels will plant about twenty-five acres. Is it worth while? Is it worth anything to know that you have seed corn that you are absolutely sure can yield 111 bushels to the acre? Are we not much surer of a good yield of corn when we have that kind of seed to plant than when we pick it from the crib?

Then to carry the comparisons just a little farther. The seed that I used in 1906 to plant this plot was taken from a field that yielded possibly sixty bushels to the acre. That year the plot yielded eighty-two bushels of weighed corn, The next year, or 1907, I planted the plot with ears selected from the best rows, as indicated by column 5, chart No. 1, and the average yield of these rows is ninety-five bushels. This year the plot yielded 102 bushels. Now, I can have seed corn to plant the plot this coming season with an average still much higher, depending, of course, on the number of rows from which I pick it. If I select it from the nine rows which are the product of Nos. 2, 5, 8 and 16 it would be 111 bushels. But there are twelve rows in 1907 that averaged above 110 bushels and twenty-three rows that are above 100 bushels. In 1906 there were but six rows that averaged above 100 bushels.

Is this not sufficient proof that the yield can be increased by the proper selection of seed? And I hope that I have made plain what I started out to prove, that to get the best yielding seed corn the crib is not the best place to select it, but that we must select it from a seed plot, where each row is planted from a single ear, so that we can know its breeding, its powers of transmission, its ability to grow corn. For in no other way can we get the best yielding seed corn only by breeding it in plots where we can control the mating, and where we can know what each ear is doing.

I find that even now one of the very hardest things for me to do is not to pick the best looking ears for seed. I have always followed that plan until the past two years. It seems like second nature. It seems like they ought to be the best ones. Yet if we will but stop to think, we know that there is but comparatively few show animals that are good breeders. We know that many times they are absolute failures. Now, while we know that that is true with animals, we seem to have never thought that it could be so with corn, and our method of planting our show ears is responsible for that notion. We have not planted them so we could see their offspring. The ears have all been shelled together and planted that way, and while we could see that we grew some good corn and some nubbins, it seems that we have never conceived the idea until very recently that some of the ears we planted were growing the big ears and others of them were growing the nubbins and that if you could eliminate those ears that were growing the nubbins and plant in their place good ears that we would thereby increase the yield. Well, now, that is true in a very great measure, much greater than we suspect. Some of those big fine looking ears do grow good ears, and some others of those fine looking ears do grow a much larger per cent of nubbins. You only have to grow a seed plot and plant each row with a single ear to find out how true that is.

We farmers have come to a point in corn growing where we must grow more corn, to make it pay on these high priced Illinois farms, or go out of business. We may talk about the proper seed bed, the thorough cultivation of the soil, the use of phosphorus, or we may apply fertilizer until our farms are as fertile as the fabled valley of the Nile, yet if we use inferior seed corn, made so by faulty methods of selection, we cannot reach the highest yields possible. It does pay to prepare a good seed bed, it pays to give thorough cultivation, and it is essential to use the proper fertilizers, for the yield can be very much improved by these things, but to get the best yields that is possible to be grown we must have seed corn with the right kind of blood in it.

Those of you who have fed cattle know that you may take a Jersey steer and feed it beside a Shorthorn, a pure breed of each, give each the same kind of feed and the best of care, and you cannot make the show steer out of the Jersey that you can out of the Shorthorn. You know that in livestock, blood tells. They must be bred right for the purpose we use them, for we can get the best results only when that is so.

Now, while that is true in livestock, it is equally true in the vegetable kingdom. It is true with corn. We may make our land fertile, and we may use the best methods of cultivation, but we will never grow the highest yields possible in corn until we have seed bred for that purpose.

If a farmer knew that probably half of the seed ears that he had picked from the crib would only grow half as much corn as the other half and that probably two thirds of his crop was obtained from half the seed he planted because half of that seed may have been from a strain of poor yielding ears would he not go to a good deal of trouble to find those ears? Would it not be worth his while to put some ears to a test and grow his seed corn so that he might absolutely know the ability of each ear to grow corn? It surely would. Well, that supposition is true in a much larger per cent than you might think. For many plots have been grown similar to this one, each row planted from a single ear, and the very best looking ears that could be picked, and no man has yet been able to pick out a number of ears, by looking at them, that were all high yielding. Some of them will invariably grow more corn than others. Why it is so no man can tell unless it is individuality, inherent powers of transmission, in which some ears are much stronger than others. A something that is all life and cannot be known only by observing the offspring.

NOTE—Following are the charts giving the record of the one acre seed corn plot in the experiment conducted by Mr. Smith:

CHART NO. 1—*One Acre Corn Plot.*

RECORD FOR 1906.				RECORD FOR 1907.					
Row numbers........	Number of pounds husked from each row in 1906.........	Bushels to an acre..	Number of seed ears selected............	Seed ears from 1906 row planted in 1907.	Weight of each seed ear in ounces—1907.	Number of hills with three stalks.......	Number of hills with two stalks..........	Number of hills with one stalk...... ...	Missing hills........
1	135	83	4	1	20.50	53	20	9	2
2	155	95	4	2	15.00	68	13	3	0
3	145	89	5	3	13.75	51	31	2	0
4	185	113	23	4	12.50	60	23	1	0
5	160	98	16	5	14.75	47	34	3	0
6	145	89	7	8	14.25	61	17	5	1
7	160	98	9	7	14.00	68	12	1	3
8	145	89	14	8	16.50	54	30	0	0
9	125	76	11	34	14.25	55	21	8	0
10	160	98	10	5	14.75	55	24	4	1
11	140	86	11	4	14.75	34	37	11	2
12	140	86	18	33	14.25	58	24	2	0
13	130	79	14	15	15.75	62	17	5	0
14	125	76	9	16	17.25	53	28	3	0
15	145	89	22	15	14.50	63	20	1	0
16	150	92	11	16	14.25	58	20	4	2
17	125	76	16	33	15.25	55	27	1	1
18	150	92	23	18	15.25	66	16	1	1
19	130	79	13	34	18.25	49	28	6	1
20	125	76	19	4	16.75	63	20	1	0
21	100	61	18	33	16.25	19	37	28	0
22	200	123	19	22	15.75	47	34	3	0
23	140	86	4	8	16.25	51	25	8	0
24	125	76	10	34	16.75	48	27	8	1
25	135	83	7	4	12.25	80	4	0	0
26	125	76	11	28	14.25	48	28	7	1
27	125	76	11	34	13.25	53	25	6	0
28	155	95	14	28	12.00	61	22	1	0
29	160	98	14	16	14.00	58	25	1	0
30	125	76	9	34	15.75	41	34	9	0
31	150	92	11	31	14.50	57	25	2	0
32	130	79	18	22	14.25	64	18	1	1
33	155	95	18	33	16.25	50	30	2	2
34	140	86	21	34	20.00	20	47	17	0
35	110	67	6	28	14.75	43	31	10	0
36	155	95	4	36	18.25	60	21	3	0
37	90	54	11	29	12.25	65	19	10	0
38	155	95	22	38	15.25	58	21	5	0
39	115	70	5	34	14.25	57	24	2	1
40	120	73	17	33	15.00	64	19	0	1
41	90	54	10	31	13.75	55	21	5	3
42	85	52	16	33	13.25	63	18	2	1
43	80	49	11	29	14.50	52	22	5	5

43 Rows, 84 Hills Long.

RECORD FOR 1907.

Number of stalks in each row..........	Number of stalks down in each row..	Number of pounds of corn husked from each row in 1907...	Bushels to an acre...	Bushels to an acre of seed ear..........	Gain in bushels over seed ear..........	Loss under seed ear.	Yield per stalk, in ounces..........	Yield per hill, in pounds..........	Number of seed ears selected..........
208	7	185	113.5	83	30.5	....	14.2	2.20	36
233	6	215	132.0	95	37.0	....	14.7	2.65	46
217	8	177	108.7	89	18.7	....	13.0	2.10	46
227	10	195	119.8	113	6.8	....	13 7	2.33	56
212	29	165	101.3	98	3.3	....	12.4	1.96	30
222	32	187	114.9	89	25.9	....	13.4	2.22	54
229	11	190	116.7	98	18.7	....	13.2	2.26	45
222	39	162	99.5	89	10.5	....	11.7	1.92	30
215	9	160	98.0	86	12.0	....	11.9	1.90	22
217	8	190	116.7	98	18.7	....	14.0	2.26	43
187	21	152	93.3	113	....	19.7	13.0	1.80	31
224	49	175	107.5	95	12.5	....	12.5	2.08	74
225	6	190	116.7	89	27.5	....	13.5	2.96	44
218	23	170	104.4	92	12.4	....	12.4	2.02	32
230	72	145	89.0	89	....	....	10.0	1.72	28
220	54	175	107.5	92	15.5	....	12.7	2.08	42
220	28	160	98.0	95	3.0	....	11.6	1.90	41
231	12	150	92.0	92	....	....	10.4	1.78	48
209	31	147	90.3	86	4.3	....	11.7	1.75	44
230	18	170	104.4	113	....	8.6	11.8	2.02	23
159	11	120	73.4	95	....	21.6	12.0	1.42	24
212	1	180	110.5	123	....	12.5	13.1	2.14	51
211	13	190	116.7	89	27.7	....	14.4	2.26	55
206	2	170	100.4	86	24.4	....	13.2	2.02	61
248	3	190	116.7	113	3.7	....	12.2	2.26	50
207	40	162	99.5	95	4.5	....	12.5	1.92	30
215	8	160	98.0	86	12.0	....	10.9	1.90	26
228	21	160	98.0	95	3.0	....	11 2	1.90	32
225	23	175	107.5	92	15.5	....	12.4	2.08	30
201	26	130	79.0	86	....	7.0	10.3	1.34	11
223	10	170	104.4	92	12.4	....	12.2	2.02	28
229	6	190	116.7	123	....	6.3	13.2	2.26	44
212	26	155	95.0	95	....	....	11.2	1.84	43
171	9	140	86.0	86	....	....	13.1	1.66	35
201	11	160	98.0	95	3.0	....	12.7	1.90	53
225	28	142	87.2	95	....	7.8	10.0	1.69	11
233	20	150	92.0	98	....	6.0	10.3	1.78	33
223	10	175	107.5	95	12.5	....	12.5	2.08	45
221	19	147	90.3	86	4.3	....	10.6	1.75	21
230	6	180	110.5	95	15.5	....	12.5	2.14	41
212	26	152	93.3	92	1.3	....	11.5	1.80	35
227	10	175	107.5	95	12.5	....	12.3	2.08	44
205	10	152	93.3	98	....	4.7	11.8	1.80	43

Chart No. 2, Showing Progeny of a Few Ears from Chart No. 1.

Rows 1906	Yield 1906	Yield 1907	Rows 1907	Average 1907		One Acre Plot.
4	113	119.8 93.3 104.4 106.7	4 11 20 25	106.0	Highest yield 1906, 123 bu., lowest, 49 bu.	1906 Seed, 60 bu. average yielded 82. bu. 1907 Seed, 95 bu. average yielded 102 bu. 1907, 9 Rows average 111 bu. 12 Rows average over 110 bu. 23 Rows over 100 bu. 1906 Only 2 rows over 100 bu.
2	95	132	2	132.0	362 Ears equals 3½ bu. seed. Will plant about 25 acres. Average 111 bu.	
5	98	101.3 116.7	5 10	109.0		
8 8	89	114.9 99.5 116.7	6 8 23	110.0		
16	92	104.4 107 5 107.5	14 16 29	106.8		
29	98	92.0 93.3	37 43	92.6	Highest yield 1907, 132 Lowest, 73 bu.	
15	89	116 7 89.0	13 15	102.8		

AFTERNOON OF THE FIRST DAY OF THE INSTITUTE, 1:30 P. M.

Frank I. Mann, Director, Presiding.

GENTLEMEN—Our time is limited, and we had better proceed. I might say that there is no element that enters into the future preservation of the fertility of our land so much as clover, and it behooves us to grow clover and to know the right way of treating it. Dr. Folsom, who has made a long study of clover insects, will talk to us.

INSECTS INJURIOUS TO CLOVER AND ALFALFA.

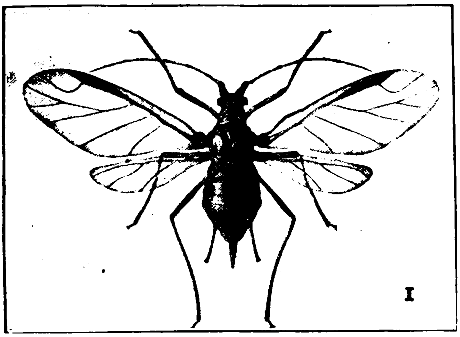
(Dr. J. W. Folsom, University of Illinois.)

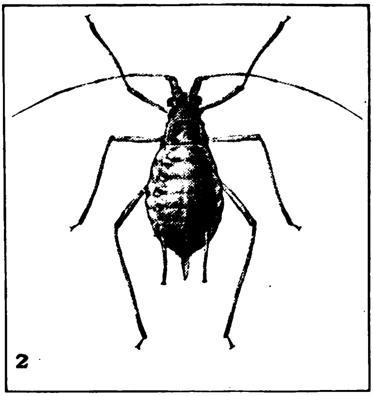
LADIES AND GENTLEMEN—Insects eat a lot of our clover every year when we don't know it. We have in Illinois more than two hundred different kinds of insects in the clover field. Not all of them feed on the plant by any means, though more than half of them do. The rest have various other occupations; for the species that attack the plant are often destroyed by other insects, and some of the insects found in the clover field are simply visitors, such as the butterflies that visit the blossoms without either helping or hindering the plant, and various beetles which gather up decaying animal and vegetable matter from the soil.

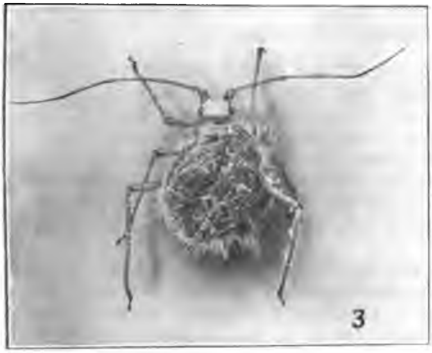
A hundred different kinds of insects eat the leaves or suck the sap from the plant, yet comparatively few of these are numerous enough to injure the plant appreciably; for red clover is such a vigorous plant that it easily sustains and repairs a large amount of injury. In fact, up to a certain point, clover is injured by leaf-eating insects no more than a fruit tree is injured by pruning. Beyond that point, however, insects make a drain on the plants. This yearly drain is unnoticed because it is constant. If we could exclude all the insects, there would result a considerable increase in the hay crop; and could we exclude all the insects except those that pollenize the clover, we should undoubtedly get an immense increase in the yield of seed. No part of the plant is exempt from attack. The roots are eaten by the root borer and other grubs, and sucked of their sap by the mealy bug. The stem is hollowed out by the stem borer; the leaves and stems are pierced by many sucking insects, and devoured by a great variety of caterpillars, beetles and grasshoppers. Clover heads are also eaten by caterpillars, beetles and grasshoppers. The ovule is destroyed by the maggot of the seed midge, and the seed as it develops is eaten out by the chalcid.

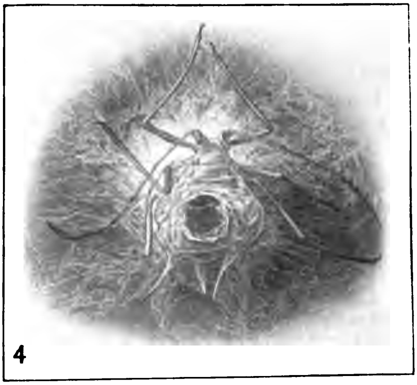
The great majority of clover-feeding insects are not restricted to clover, but have other food plants. Of the pests, the seed midge and the seed caterpillar are confined to clover so far as known; the seed chalcid occurs on alfalfa as well as clover. The root borer has been reared from peas, and the hay worm moth from dead grape leaves from a vineyard. The leaf weevil eats clover, alfalfa, timothy and beans, and the clover louse has a long and varied list of food plants.

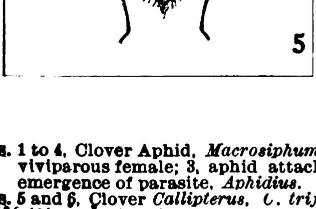
Here, where alfalfa has been recently introduced, its insects are essentially those of clover, though of the seven clover pests only the seed chalcid, the leaf weevil and the root borer have as yet been recorded from alfalfa. In this talk I refer especially to these insects as they occur on red clover, unless some other plant is specified.











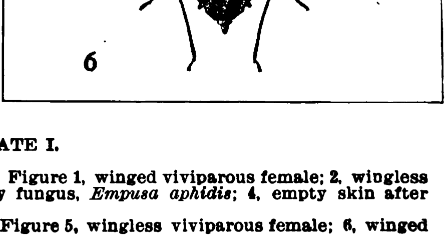


PLATE I.

FIGS. 1 to 4, Clover Aphid, *Macrosiphum pisi*. Figure 1, winged viviparous female; 2, wingless viviparous female; 3, aphid attacked by fungus, *Empusa aphidis*; 4, empty skin after emergence of parasite, *Aphidius*.

FIGS. 5 and 6, Clover *Callipterus*, *C. trifolii*. Figure 5, wingless viviparous female; 6, winged viviparous female.

Here is the *Clover Leaf Weevil*. You may have seen this in the spring. It is found throughout the State, and was introduced from Europe. In the latter part of March the first injury is seen in the form of little round holes in the clover leaves. If you look on the ground under the rubbish you will find little green grubs like those on the chart (Fig 1). In the day time they rest on the ground curled head to tail, but at night they crawl to the plant and do the damage. In June these grubs spin cocoons (Fig. 2), become pupæ (Fig. 3), and finally turn into beetles (Fig. 4). These beetles you can find any day during the summer. They do even more damage than the

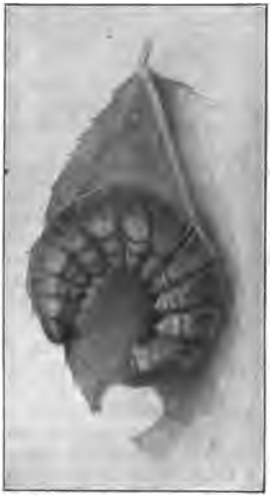


FIG. 1. Clover Leaf Weevil, *Phytonomus punctatus*, larva.

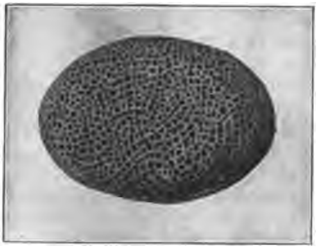


FIG. 2. Clover Leaf Weevil, *Phytonomus punctatus*, cocoon.

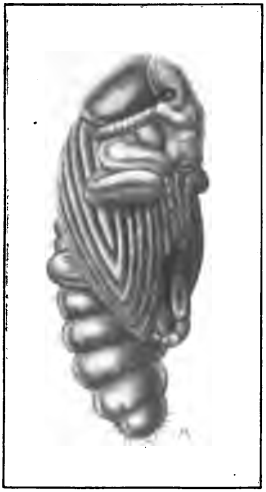


FIG. 3. Clover Leaf Weevil, *Phytonomus punctatus*, pupa.

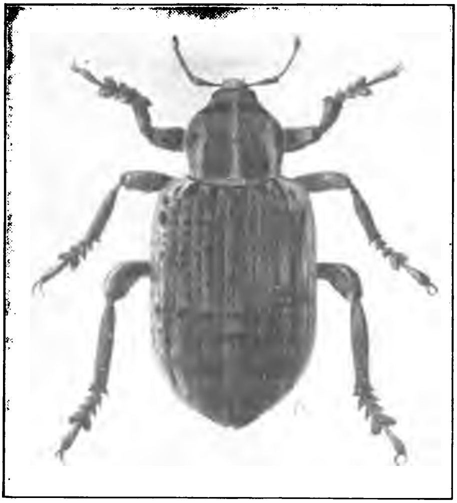


FIG. 4. Clover Leaf Weevil, *Phytonomus punctatus*, beetle.

grubs, stripping the leaves, and sometimes eating the plant down to the ground. Late in the summer they lay eggs. These hatch and the young grubs hibernate. Many of them are killed by the cold, but plenty survive. You can bring in clover sod at any time during the winter and get these insects by starting the growth. This insect constantly threatens the plant, but rarely does any serious damage. In moist weather there comes a fungus disease which sweeps them off like magic. If, however, the grubs are present in alarming numbers in the spring, the thing to do is to cut your clover early, or to pasture it a little or clip it back in May or early June. This is not one of the worst pests in this country, though it has done some damage in Europe.

Now, here is a common insect: a big, green, long-legged plant louse (Pl. 1, Figs. 1, 2). We will call it the *Clover Aphid.* Late in June and early in July it often crowds the clover plants, leaving literally no standing room. It is the largest of the aphids found on forage plants, and it sucks the sap from the clover. If the plants get plenty of rain, however, they often survive. We find but few of these clover lice in spring, and these are all females which bear their young alive. In fact, only females are produced until late in the season. The generations succeed each other rapidly. We have obtained as many as eighteen generations in a single season, beginning with a single female that had survived the winter. A single female produces often ninety young, and the record is one hundred and forty-seven, the average being forty-sixth. That is not extraordinary for an insect and the chief reason that they overrun plants as they do, is that they come to maturity so soon. Thus a female begins to produce young in from eight to twenty days after her birth, with an average of eleven days, and a female averages six young per day. At intervals winged females (Pl. 1, Fig. 1) are produced by means of which the species spreads to other localities, starting new centers of infestation. Males do not occur until autumn. The eggs are then laid, fertilization appearing to be essential to the production of the winter eggs.

Question—How large are these insects?

Answer—They measure about 4 or 5 millimeters in length, a millimeter being about one twenty-fifth of an inch. They are the largest lice found on clover.

Question—Are they very injurious?

Answer—They are. In 1899 in Maryland, they destroyed $3,000,000 worth of peas. In this State they have killed hundreds of acres of clover.

Question—What part of the plant does it attack?

Answer—When they are first born and few in number they attack the tenderest leaves and stems. Later they are forced by their numbers to spread all over the plant. There are so many of them that they push one another off.

Question—Are they found largely on the second crop, or both?

Answer—Both. They enter the clover field during the first year. Their worst injury is done to the hay crop of the second year, though not a few of them can always be found on the seed crop.

Question—What effect does it have on the clover seed?

Answer—The effect is such as results from the diminution of the vitality of the plant as a whole.

Question—They do not feed on the blossom?

Answer—Not especially, though some may be found on the heads.

In DeKalb county, August 19, 1903, I saw eighty acres of clover which had been killed by this insect. At that time there were none but dead roots in the field, and the ground was covered with the white skins of the plant lice. At cutting time the plants had been so loaded with lice that some of the help refused to handle the crop. The weather was dry, and the roots failed to give any new growth. It often, if not usually happens, that when the plants are loaded with these lice a single heavy rain will wash them to the ground, kill nearly all of them, and save the plants. Furthermore, this clover louse has a long list of insect enemies. In fact, I know of thirty-four insects in the clover field that get a living, either directly or indirectly, off this clover louse. Take for instance the lady bird beetles and their grubs (Fig. 5). We have several species of these. They are among the best friends of the farmer, there being only one species that is a vegetarian. These beetles and their active, bright-colored grubs devour the plant lice at a great rate.

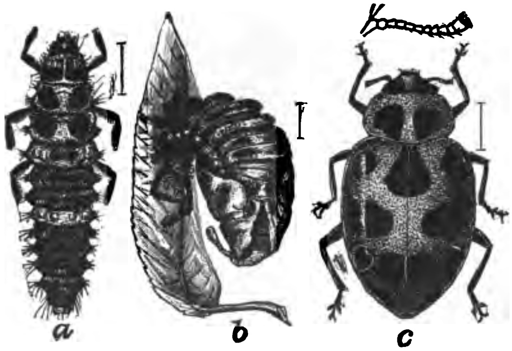


FIG. 5. Ladybug, *Megilla maculata*, *a*, larva; *b*, empty pupal skin; *c*, beetle. (Chittenden, Circ. 43, Bur. Ent., U. S. Dept. Agriculture.)

Question—Do plant lice ever attack timothy?

Answer—Some species, but not this one, so far as I know. Another insect enemy of the clover louse is the lace-wing fly. The adult is a filmy green insect (Fig. 6). You must have seen them flying around herbage and fruit

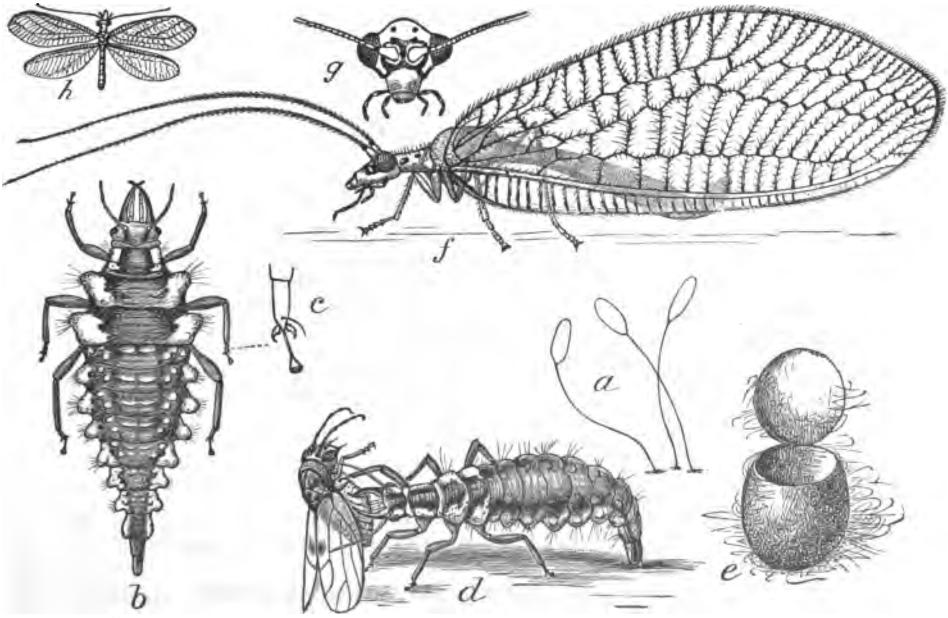


FIG. 6. Lace-wing Fly, *Chrysopa oculata*: *a*, eggs; *b*, larva; *c*, foot of same; *d*, larva devouring pear-tree *Psylla*; *e*, cocoon; *f*, adult; *g*, head of same; *h*, adult, natural size. (Chittenden Circ. 43, Bur. Ent., U. S. Dept. Agriculture.)

trees. Probably you have seen their eggs, also, laid each at the tip of a long thread-like stalk, as in the figure. The larvæ of these have long sickle-shaped jaws by means of which they suck the blood from the aphids. The syrphid flies (Fig. 7) are enemies of the clover lice. You have often seen these "sweat-bees," with their black and yellow colors poising over one spot a few moments and then dashing off to another. They lay their eggs in colonies of plant lice, and their larvæ, or grubs (Fig. 82), leech-like in form and greenish or yellowish in color, kill immense numbers of the plant lice by taking the juices from their bodies. Then there is a fungus that often sweeps off the clover lice after moist weather. The dead lice will be found clinging to the plant, but with the body brown and distended (Pl. 1, Fig. 3).

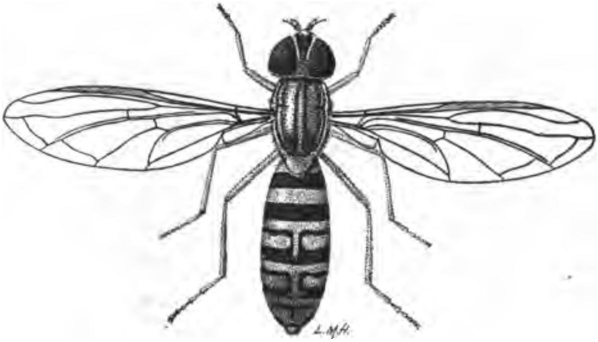


FIG. 7. Syrphus-fly, *Mesogramma politum*, adult.

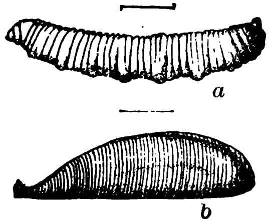


FIG. 8. Syrphus-fly, *Mesogramma politum*: *a*, larva; *b*, puparium.
(Riley and Howard, U. S. Dept. Agriculture.)

We can usually rely upon this epidemic disease to kill off most of the clover lice. The louse has also certain insect parasites which feed inside their hosts (Pl. 1, Fig. 4). In fact, this plant louse, helpless against its enemies, is largely held in check by a great many adverse influences, and the damage that it threatens to do often fails to materialize. If, from the numbers of the insect, you anticipate any damage, however, it is best to cut the clover early. If you wait until July, and the clover is loaded with lice, the chances are that the new growth will never spring up from the roots, especially if drought occurs.

Question—What effect does that have on the fall growth?

Answer—Only the effect to hasten it.

Question—How does it kill the insects?

Answer—By starvation. The lice are not able to go far elsewhere for food when the clover dries, with the exception of such comparatively few females as have wings.

Question—Would there be any more lice in the field that year?

Answer—There might be a few derived from the winged females coming in from elsewhere, but their numbers would be of no importance.

Now here is the worst of the seed pests, the *Seed Midge* (Figs. 9, 10). The fly is so small that you may not have seen it, but you can find the flies readily when they are most abundant, and that is ordinarily about May 24th. In

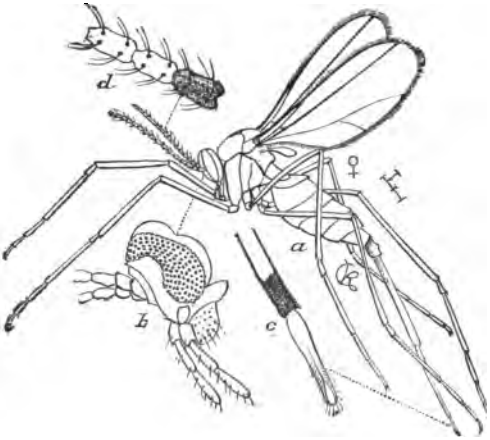


FIG. 9. Clover Seed Midge, *Dasyneura leguminicola:* *a,* female; *b,* head; *c.* tip of ovipositor; *d,* antennal segments. (Webster Circ. 69, Bur. Ent., U. S. Dept. Agriculture.)

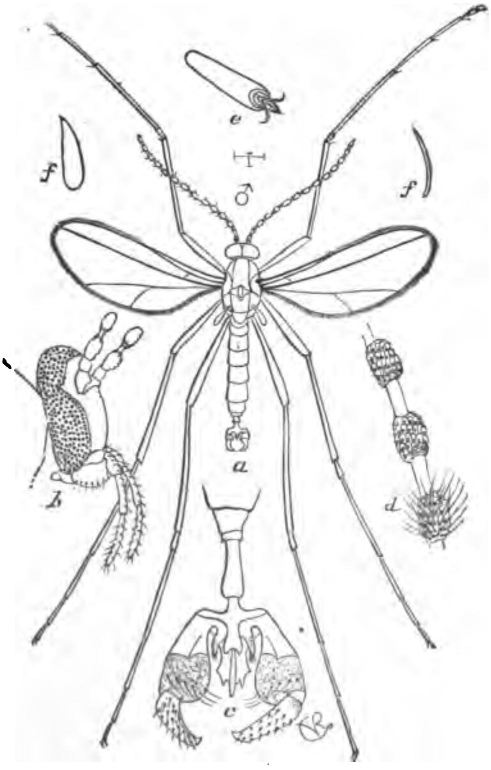


FIG. 10. Clover Seed Midge, *Dasyneura leguminicola:* *a,* male; *b,* head; *c,* genitalia; *d,* antennal segments; *e,* tarsal claw; *f,* scales. (Webster, Circ. 69, Bur. Ent.. U. S. Dept. Agriculture.)

other words, they are most abundant when young green clover heads are most numerous. They are abundant again late in July and early in August. They lay their eggs on the green clover heads. They will not lay them on heads that are in bloom or heads that have ripened. The female has a long, flexible, lash-like ovipositor which she inserts among the flowers, laying an egg at the base of a floret. These eggs are barely visible to the naked eye, they are so small. They hatch in three days, and the grub, reddish, pinkish, or sometimes white, appearing as in Figure 11, squeezes into the bud and devours the semi-fluid contents of the ovary. This is, of course, before the flower has been fertilized. Now we can get rid of this pest very easily. All you need to do to save your seed from the midge is to cut the hay crop a little earlier than usual; in this latitude as soon as possible before the 17th of June. You can even wait until a large part of the clover is fresh in bloom, but you should not wait until many of the heads have turned brown. If you cut your clover early you catch these grubs in the heads, and they are killed as the clover dries. Furthermore, you hasten the maturity of the second crop of heads, and by the time the second brood of midges is on the wing the heads are too ripe for them to lay their eggs in. I saw the value of this early cutting in a field in DeKalb county on August 19, 1903. On that date I examined twenty acres of red clover. It was in full bloom and gave every promise of a large seed crop, five bushels to the acre anyway, and scarcely a midge could I find in the field—only two—and not an egg was I able to find. This clover had been cut June 25th. Now, just across the road was another field of clover of the same kind, sown at the same time, and in fact exactly like the other field except that it had not been cut until July 7th. In this second field the heads were all green and swarmed with winged midges and were loaded with their eggs. Oftentimes there were more eggs than there were flowers on a head; thus on one head I found 106 eggs and only 80 flowers. Here, then, a difference of two weeks in the cutting meant all the difference between immunity on the one hand, and complete infestation on the other. In Indiana, New York, Ohio and Michigan, where they know how to raise big crops of seed, they make a practice of pasturing the clover in May or early June, though they don't always know why they do so. Here we do not pasture much, but might easily clip the clover back and secure the same beneficial result, and affect not only the seed midge, but also the almost equally injurious seed chalcid.

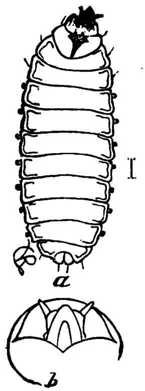


FIG. 11. Clover Seed Midge, *Dasyneura leguminicola*: *a*, larva; *b*, head, retracted. (Webster, Cir. 69, Bur Ent, U. S. Dept. Agriculture.)

This *Seed Chalcid* does an immense amount of damage to the seed, and a damage that is not seen; you simply get a small yield of seed without knowing why, when a large part of the loss is due to this insidious insect. The grub (Fig. 12) lives inside the ripening seed and eats it out, leaving only a shell. It works on alfalfa as well as clover. The adult is a minute, black, fly-like insect, as shown in Figure 14. We find it in abundance on clover heads about June 12th, and again in the middle of August. They are most numerous whenever there is the largest number of clover heads just turning brown. These insects do not lay eggs in the green heads like the seed midge, and they can not lay eggs in seed that are hard. Most of the eggs are laid in the seeds of flowers which have just begun to wither—flowers that have been fertilized, and the seeds of which are going to develop. The female thrusts her long needle-like ovipositor into the green seed and lays an egg (Fig. 15) therein, and the grub when fully grown nearly fills the seed. The adult escapes from the seed by biting out a hole in the shell. At threshing time these shells are swept away with the chaff, though many of the seeds from which the adult has emerged remain behind with the sound seeds. These affected seeds can be easily recognized. Instead of being clear yellow tinged with blue at one end, or blue all over, and plump, they are brown, a little misshapen, and some times a little undersized.

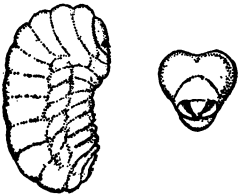


FIG. 12. Clover Seed Chalcid, *Bruchophagus funebris*: larva; head at right.

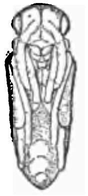


FIG. 13. Clover Seed Chalcid, *Bruchophagus funebris*, pupa.

(Webster, Circ. 69, Bur. Ent., U. S. Dept. Agriculture.)

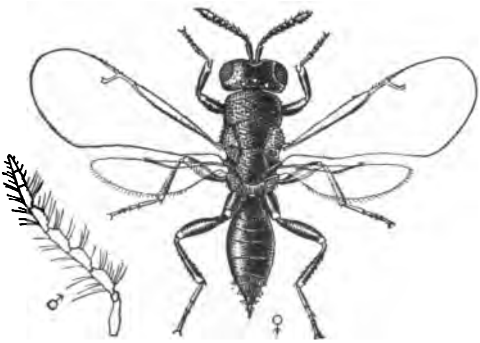


FIG. 14. Clover Seed Chalcid, *Bruchophagus funebris*: adult, female.

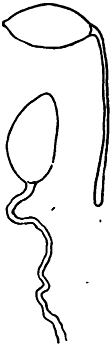


FIG. 15. Clover Seed Chalcid, *Bruchophagus funebris*: eggs.

(Fig. 14. Webster, Circ. 69, Bur. Ent., U. S. Dept. Agriculture.)

Q. Will clover seed having a grub in it grow?

A. No.

Q. About how much of the heads ought to be turned black before you cut the clover?

A. None of them, if you want to get rid of these insects that I am talking about. Professor Carter, who has had a large experience with clover, says

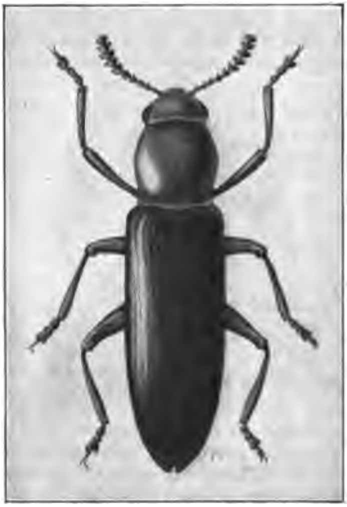


FIG. 16. Clover Stem Borer, *Languria mozardi*, beetle.

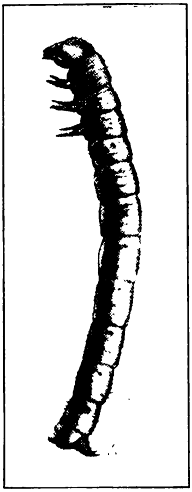


FIG. 17. Clover Stem Borer, *Languria mozardi*, larva.

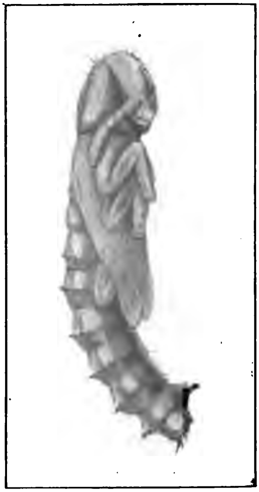


FIG. 18. Clover Stem Borer, *Languria mozardi*, pupa.

that if you want a good crop of hay you don't want to let any of it turn black. This chalcid passes the winter inside the clover seeds on the ground.

Q. Is there any danger in commercial seed, from this pest?

A. I have examined commercial seed on several occasions in order to determine that, but all the larvæ that I found in the seeds happened to be dead. It is possible, nevertheless, that there is some danger of sowing this pest along with the seed, especially if the seed is sown broadcast; if drilled in the insects would never see the light. To get rid of this seed pest, cut your clover early, as just recommended against the seed midge, or pasture or clip back in May or early June.

The Clover Stem Borer—If you cut old clover stems near the ground and look at the cut ends, some of them show the solid white pith and others the burrows of this boring insect, which eats out the pith, leaving the walls of the burrow brown and discolored. The beetle (Fig. 16) lives over winter as an adult, comes out in spring and lays its eggs not only in red and mammoth clover, but also in wild sweet clover, ragweed and various other weeds. There is only one generation a year. The mother beetle bites a hole in the side of the clover stem and with her ovipositor reaches to the pith and inserts an egg. The grub (Fig. 17) transforms within the clover stem and the beetle emerges by cutting a round hole through the side of the stem. The injury done by this insect is chiefly mechanical, although the insect in destroying the pith deprives the plant of some of its reserve food material in the form of starch. These hollowed-out stems, when they get large, fall to the ground easily, carrying the flowers to the ground, become covered with dirt and are not easy to mow. Cutting the clover at the usual time always gets rid of these insects, numerous as they may be, for the old beetles disappear early in July and the new beetles do not begin to come out until about the first of August, and normal cutting finds almost all of the insects inside the stem.

Q. Will they appear earlier in the season in the southern part of the State?

A. Yes, sir.

Here is a bad insect. We are indebted to Europe for this. It is known as the *Clover Root Borer*. The beetles (Fig. 19) are small, cylindrical and brown. They belong in the same group as the bark beetles that make their galleries under the bark of dead trees. If it is present in red clover in May or June you will know it; the plant is stunted, flowers imperfectly, breaks off easily at the crown, withers and dies. This insect has killed an immense amount of clover in New York, Michigan and Ontario. It has been injurious in Ohio and occurs in this State, but is not very injurious as yet. The beetles come out from the roots in May and lay their eggs on the roots, and the grubs—stout, white, footless creatures (Fig. 20)—tunnel along the roots

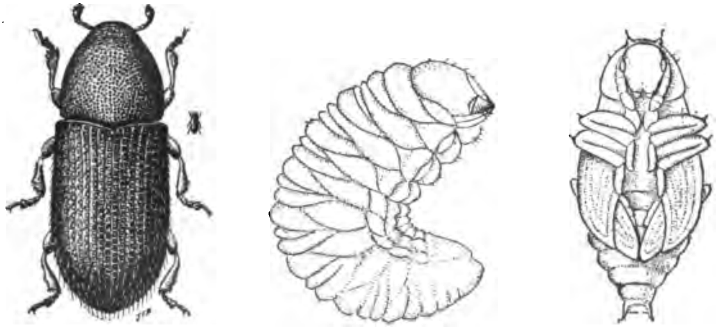


FIG. 19. Beetle. FIG. 20. Larva. FIG. 21. Pupa.

Figs. 19, 20, and 21. Clover Root Borer, *Hylastinus obscurus*.
(Webster, Circ. 67, Bur. Ent., U. S. Dept. Agr.)

(Fig. 22). You can find this pest in its various stages in the clover roots at almost any time throughout the year. Where it is bad you can not do much, except to plow the clover under, even though, with sufficient rain, the plant can stave off the injury far into the season. In Canada they prize red clover so highly as green fertilizer that they do not hesitate to plow it under at the first signs of the presence of this insect.

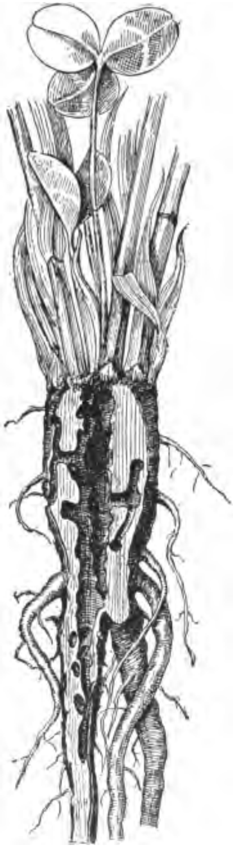


FIG. 22. Clover Root Borer, *Hylastinus obscurus:* work of insect. (Webster, Circ. 67, Bur. Ent., U. S. Dept. Agr.)

The Clover Hay Worm.—This occurs in stacked or stored clover. It is active in winter. They work at the bottom of the hay where it is warmer and moister than elsewhere. They eat the hay and web together the rest of it with silk, intermingled with black particles like grains of gunpowder. The hay appears as if mildewed and stock refuse to eat it. In fact, if there is much moisture a fungus is present also. These wriggling, brownish caterpillars (Fig. 23) turn into purplish moths with yellow markings, shown in figure 24. The moths often enter houses at night and fly to the lights. Now to get rid of them. They live over on old clover hay and the new hay should not be stored or stacked on the remains of the old. The old refuse hay should be cleared out and burned. Out of doors, the moth lays her eggs at the bottom of the clover stack, especially if the stack rests on the ground, and a good preventive is to erect the stack on a platform of logs or rails, giving it ventilation underneath. Another good method is to salt the stack for two or three feet from the bottom.

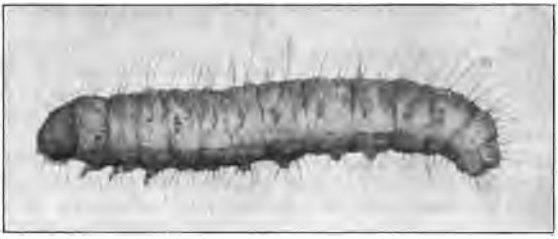


FIG. 23. Clover Hay Worm, *Hypsopygia costalis*, larva.

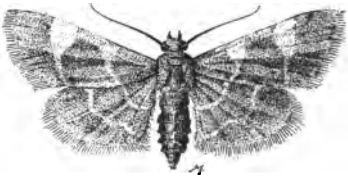


FIG. 24. Clover Hay Worm, *Hypsopygia costalis*, moth.

Q. Would it bother perfectly dry hay?

A. No. It is injurious in proportion to the warmth and moisture.

Q. If your barn has no refuse in it, or if you do not put the new stack on the remains of the old one, do you need to salt it?

A. It would be a wise precaution in a region where this pest is known to occur.

Q. Is it not a good thing to salt the clover anyway?

A. Salted clover is more palatable to stock.

Mr. G. R. Love—I never put it up without salting; it does not hurt the stock any, certainly.

Q. How much salt to the ton?

Mr. Love—About a half gallon to the ton.

Q. A gallon might hurt?

A. It might be too much.

It is curious that in a stack of mixed clover and timothy this insect will go through it and eat the clover and leave the timothy; though some of the timothy does not escape injury.

Professor Carter—The insect has a lot of sense to leave the timothy and eat the clover.

I should say, in reference to early cutting when timothy and clover are mixed that a mixed meadow has got to stand longer than a meadow of pure clover. In that event you can, however, clip back the growth in the spring or early summer to avoid the insects, and then cut your hay crop when you choose.

Mr. Love—Would it not be better for the farmer, to sow his clover and timothy separately?

A. That is a matter of individual preference.

Q. Does this attack alfalfa?

A. Not that I have been able to find. The three clover pests that attack alfalfa also are the root borer, leaf weevil and to some extent the seed chalcid, but none of them are as yet injurious to alfalfa in this State, in my experience.

Q. What do you think of alfalfa as being a generally cultivated crop in Illinois?

A. Well, I will not venture an opinion on that subject. Some of the other men at the university have very decided opinions, however.

Just remember that cutting the hay crop when it has just begun to bloom, and as much earlier than that as possible, or else pasturing or clipping back the growth still earlier in the season, will circumvent the worst of the insects injurious to the seed crop. Another thing—lots of these insects enter the field in the latter part of the first year of the growth and lie over until the following spring; so it is a wise practice to clip the clover late in its first season, removing especially the premature heads that are present. You must cut early enough to allow the plant to recover itself before frost, say two or three weeks after the oats harvest.

Q. I have always been afraid to cut them.

A. Go ahead, if you do not anticipate any drought, but give the plant plenty of time to get a good growth before winter.

Mr. Love—Most of our farmers pasture too close do they not?

A. I think they do.

Mr. Love—It will not stand that?

A. No.

Another thing is to destroy the volunteer clover. If you knew how many insects the volunteer clover carries over, you would not raise it. You can easily cut it twice a year when you cut the cultivated clover. When we want to find clover pests in abundance, we never fail to find them by the roadside or the railroad track. Another thing is not to allow clover to run for more than two years. It will run longer if you let it.

As to the important subject of the fertilization of the plant. Darwin and many others since him, proved the importance of the bumblebee in pollenizing the red clover. It is a fact, however, that the honey bee, especially the long-tongued varieties, pollenize red clover to some extent, whether their tongue is shorter than the average corolla tube or not. It certainly is shorter than the average nectary, but in flowers that are undersized, as in time of drought, or in flowers which secrete a copious supply of nectar, the honey bee can often get some. The Italian variety is always abundant in our red clover fields, and I know, from observation of the bees confined between two sheets of glass on clover blossoms, that they go through the motions of pollination, whether they get any nectar or not. So they help the bumblebee to some extent; exactly to what extent I do not know. We ought to take care of the bumblebees. They do not injure the farmer, except locally, and their wholesale destruction should be prevented.

Q. Don't you think there are getting to be less and less bumble bees all through this country now?

A. That is hard to say. Their numbers vary greatly from year to year in any one locality, owing to different circumstances. Only the queens survive the winter. In the spring they are comparatively few in number, and last April in central Illinois, after three weeks of raw and often freezing weather, very few bumblebees could be found. Usually, however, there are enough bumblebees to pollenize all the blossoms. They work very rapidly.

Now to summarize:

Methods of Control—The insect pests of clover are few in number and as a rule within our control if we choose to control them. Furthermore, they can be controlled as a class by methods that interfere but little, if any, with customary farm practice. The worst pest to deal with is the root borer in regions where it has established itself. One has to plow under, or use what clover there is for pasturing, for this insect has things pretty much its own way. Should the hay crop be threatened seriously in spring by the leaf weevil or the clover louse, pasture it or clip it back in May—not too much of course; otherwise cut the hay crop as early as possible in order to insure a good second growth. These two insects, however, are usually reduced materially in numbers by natural means. To get rid of the worst of the seed insects, cut the hay crop as early as possible—at the latest when it has just begun to bloom; or pasture or clip back late in May or early in June. Pasturing or cutting red clover in the latter part of its first year is good practice, as it goes far to reduce the number of insects for the following year in the same field. Destroy volunteer clover, which is a rich nursery for the clover insects. Do not allow red clover to run for more than two years in this region, where it is for agricultural purposes a biennial.

I thank you, gentlemen, for your attention.

HOW THE UNIVERSITY TEACHES DAIRYING.

(On the subject of Butter and Cheesemaking, before the Farmers' Institute, Peoria, Illinois, February 13, 1908.)

Address by Professor C. E. Lee.

Ladies and Gentlemen; Mr. Chairman—We now pass on to the course that I have charge of, namely, the making of butter and cheese. If there is one thing that we are interested in, it is the making of good butter and cheese. The first course we really give the boys is that in the making of cheese. In that course the boys become very familiar with the different varieties of cheese placed on the market. For example, very few people today know what full cream cheese is. In making full cream cheese, we start with skim milk cheese to show inferiority and go on from that to milk with an average per cent of fat and then to milk with 4½% to 5% of butter fat. In this work we show them how to make and cure it to bring out the best possible results. The next course is that of the making of butter, which comprises a study of the care of milk and cream on the farm and the handling of the cream in a manner that will give a finished product.

This slide simply shows us a milk house. A milk house of this type should be on every farm. But not every farm can have a milk house like this which is constructed over a stream of running water, at 52° F., an ideal place to keep milk.

This shows the interior of a well constructed dairy house on a farm, with gasoline engine, separator, etc., kept in good sanitary condition.

A number of you may remember how butter was made years ago. The cat used to get in there once in a while, and test the cream. [Laughter.]

Here is a gasoline engine.

Delegate—Does not that gasoline engine scent the milk?

A. The question was asked, does the presence of the gasoline scent the milk remaining in the room? You must not let it remain in the room. You have to be very careful. I saw some very fine butter, made a short time ago, to be exhibited at the convention. As I was examining it I noticed the odor of gasoline. The butter maker could not account for it, but after thinking the matter over he remembered he had taken out a part of the butter and left it standing in the room while the gasoline engine was running, and that odor got into the butter.

This slide shows the work of separating the milk from the cream in the university dairy. The boys get the practical demonstration of separating the cream from the milk. They study the efficiency of the separators, etc., as to how much butter fat is left in the milk skimmed by this method, as compared with the old method of creaming milk.

This separator at the bottom here, is one of the large ones used in a dairy. This slide also shows it. The boys start in by skimming milk at a low temperature. In order to give the best results the milk should not have a temperature less than 90° F. The boys seem to enjoy this work very much.

This shows the interior of a creamery, with an old-fashioned churn and cooler, and the cream ripened ready to be made into butter. Over here is the place where they put the butter after it is churned. It is taken out of the churn and worked on a table worker and then put in packages for the market. Of course we have at the present time a much better method of handling butter. Here is a package filled full.

This shows the butter taken out of the churn in a granular condition. Two men printing butter for the market. This can be done on any farm. Here is a man printing butter by the old style printer. This plant makes twenty thousand pounds of butter a day. The best on the market. Good butter is always in demand. A quarter of a pound a day would not hurt anyone.

The main thing in the use of separators in any creamery or dairy is the getting of the right proportion of cream. The ripening of cream is very important. We must have the proper facilities and employ the proper temperature in order to get good results.

This shows a creamery, in the northern part of the State, where the farmer hauls the skimmed milk back to the farm to be fed to young stock.

Another view of a creamery showing the wagons as they are hauled up to the creamery. Another old fashioned creamery, not as modern as some others I have shown you.

This is a skimming station. A small plant operated by tread power. Farmers delivering the milk. It is skimmed and the cream halued to a central plant. Here is a wagon. When on the road, the milk cans are covered. No milk ought to be hauled over country roads in uncovered wagons. Protect them in the winter time with a good warm blanket and in the summer time with a wet blanket. There is lots of loss from sour cream and milk being delivered to our creameries.

Here is a picture I want to show you. This shows the milk wagons, 27 in all, delivering milk to a single creamery located in a prosperous Iowa town. This creamery receives on an average 60,000 pounds of milk a day. If we go into this neighborhood we will find that the farmers are all interested in dairying. They are making money, too. Forty miles further north of this, in what is called the dairy section of Iowa, I called on one of the leading dairymen in that section. I talked to him about his business. He said "The past year my cows netted me an average of $30.00 each which I consider pretty good. I quit using the hand separator a few years ago. I now skim the milk by the deep setting system. It gives me a better grade of skim milk for the calves." Just think of the loss of butter fat. Now this is practiced in certain sections of Iowa. Is it practiced in Illinois? I hope not.

This is the oldest cheese factory in the State of Illinois.

This is the interior of our cheese room at the university. This view shows the boys making cheese. The cheese press, where the cheese is made up into its form. Here is one where they first put the cheese. This cheese was made from milk containing 4½% of butter fat. This shows a skim milk cheese. There was a time in this State when they made skim milk cheese. They got about seven pounds of cheese from 100 pounds of milk, while this cheese averaged eleven to 100 pounds. To say nothing of the quality of the different kinds of cheese. We should make good cheese because it will increase the consumption of it. Consequently we will have to produce more cheese to meet the demand.

Showing a variety of cheese made at the university.

Young American and an imitation of the English cheese, Swiss cheese, limberger, brick, regular cheddars, etc.

The refrigerating machine at the university.

Boys getting ready for churning.

A churn now used in the creameries. The butter ready for market, when it comes out of the churn.

This picture represents boys at work. This shows a young man from Chicago interested in his father's business. Another young man from Chicago who had never seen butter made, but ready to learn.

This represents a few Babcock bottles after the test was completed. A certain farmer advertised his herd of cows for sale. He asked us to test the milk. We found it contained from 8 to 12 per cent of butter fat. We didn't give him the result of the test. He wanted to know why. We simply said: "Why did you mix cream with the milk in the sample?" He didn't know that if he put cream in these bottles it would effect the test.

I thank you. [Applause.]

Adjourned.

R. C. OBRECHT.

FITTING HORSES FOR MARKET.

(Prof. R. C. Obrecht.)

MR. CHAIRMAN AND MEMBERS ILLINOIS FARMERS' INSTITUTE—By the way of introduction of my talk I want to quote a few figures as given out by the Department of Agriculture, Washington, D. C., on January 1, 1907, in order that you may see how Illinois ranks with other states in number of horses and their grade and valuation. On January 1, 1907, Illinois had 1,575,000 horses at an average price per head of $109.00 or a total valuation of $171,990,000.00. This is 184,050 more horses than Iowa has, our nearest competitor, and the Illinois horses are valued at $9.00 more per head. This makes Illinois horses worth $32,811,510.00 more than the horses in Iowa.

Ohio is the only other state that has a hundred million dollars or more wrapped up in horses and she has less numbers than Iowa.

I think it is not fair to compare the number of horses in one state with that of another without also taking into consideration the number of mules, as it takes a mare to produce a mule. Illinois has 141,909 mules at an average valuation of $117.00 per head, while Iowa has 43,655 mules at an average valuation of $108.00 per head. Here again Illinois leads Iowa by 98,000 mules within her borders. From this you will see that Illinois has 282,304 more horses and mules than Iowa, which represents 44,777,600 more dollars tied up in this industry in Illinois than in Iowa, our nearest competitor. The only state in the Union that has a larger number of horses and mules than Illinois is Texas, and here the grade is so low the total valuation is much less than in Illinois.

The total valuation of horses and mules in Illinois is $57,349,145.00 greater than the combined valuation of all the cattle, sheep and swine; or in other words, nearly 59% of Illinois live stock wealth lies in her horses. If it were possible by some means or other to increase the value of Illinois horse stock $10.00 per head, the total increased wealth to the State would then be $17,169,100.00, a nice little sum of money and one which would run the agricultural experiment station for nearly 200 years at the rate of our present appropriations.

I am going to tell you about one way in which the value of market horses may be increased more than $10.00 per head, and if all the horses that are annually sent to the market from Illinois were properly fitted it would mean millions of dollars to Illinois farmers.

Two years ago the experiment station decided to undertake an experiment in fleshing horses for market in order to secure some data upon this subject and to determine if it is advisabe to encourage Illinois farmers to market their grain and hay in the form of horseflesh. Eighteen horses, thin in flesh, were purchased with which to conduct the test and were divided into three lots of six horses each. With the exception of two horses, they were all of the type known on the market as eastern chunks. The two exceptions noted being farm mares, which did not interfere with the value of the experiment in any way as they were as good feeders as the average of the lot. The horses were purchased from a local dealer at a contract price of $185.00 per head and were received at the university about the middle of January, 1906. Judging from their appearance, probably most of them had not been stabled during the early part of the winter, as they were rough in hair and rather thin in flesh. A few of them, however, were in better flesh and showed the effects of better care.

After the horses had been divided into three lots as nearly uniform as possible and started on the preliminary feeding, they were appraised by three expert horsemen selected for the purpose. One of the men was a horse commission man from the Union Stock Yards, Chicago; another was a buyer that buys in the country and ships a load to the market about every week, and the other man was an extensive feeder of horses, who also shipped horses to the market occasionally. My purpose in having this committee was to determine as accurately as possible the real value of the horses at the beginning of the experiment and then have the same committee see the horses when they were fat and place a value on them in their finished condition. By this means I would be able to get at the value of the additional flesh which the horses put on.

At the beginning of the experiment, the horses were appraised at $178.24, being $6.76 less than their actual cost. At the end of the experiment they were appraised at $226.76 making an increased value of $48.53 per horse for the entire lot.

The feeds used in conducting this experiment were corn, oats, clover hay, timothy hay, bran and oil meal. Lot 1 received corn and clover hay; lot 2 received one-half corn, one-half oats and clover hay, lot 3 received one-half corn, one-half oats and timothy hay. Because of the nature of timothy hay being rather constipating to horses not having exercise, and fearing sickness such as colic, it was decided best to add some bran to the ration of the horses getting timothy hay. It was not anticipated that the bran would be of very great benefit, if any at all, to the horses receiving clover hay, but in order to make results comparable, the same quantity of bran was fed to the horses getting clover hay as was given the horses getting timothy hay. The bran was given in the form of a two or three pound mash at the noonday feed, the quantity being regulated somewhat by the appetite of the horse and the condition of his bowels. During the last four weeks of the test all the horses received some oil meal. The first week of the last period the horses were given a half a pound each daily; the second week, one pound; the third week, one and one-half pounds and the fourth week two pounds.

This test extended over a period of eighty-four days, which was divided into three periods of twenty-eight days each. Water was given the horses three times daily, morning, noon and night. They had salt before them at all times in order to encourage them to drink as much water as possible. At the beginning of the experiment I tried keeping water before them at all times but found that they would soon befoul it and in their idle playfulness would destroy the pails, so this practice was discontinued.

The horses were tied up in single stalls and did not receive any exercise except just as they were led to and from the scales on weigh days once each week. Cared for in this way, it was thought the results would give light on the following points: The extent or quantity of gains; the rapidity of gains; the economy of the gains as measured by feed consumed; the nature of the gains as affecting conformation and ultimately the commercial value; the relative profit to the feeder after considering all expense and income.

Owing to the short time expected to feed the horses they were put on full feed in much less time than would usually be considered good practice by cattle feeders. They were put on full feed in three weeks after the beginning of the experiment, but at no time were they fed more grain than they would readily consume and were given all the hay they would eat.

You would now be interested in the results of the test. From the chart you will see that the horses in lot 1 receiving corn, bran, oil meal and clover hay weighed 1,345 pounds at the beginning of the experiment, and at the end, 1,537 pounds, making a gain of 192 pounds per horse. The horses in lot 2, receiving corn, oats, bran, oil meal and clover hay weighed 1,356 pounds at the beginning of the experiment and 1,606 pounds at the end, making a gain of 250 pounds. The horses in lot 3, receiving corn, oats, bran, oil meal and timothy hay weighed 1,319 pounds at the beginning of the experiment and 1,477 pounds at the end, making a total gain of 158 pounds per horse. You will notice from the chart that the horses in lot 3 were somewhat lighter at the beginning of the experiment than those of the other two lots. The horses were as large, but the difference in weight was due to their being thinner in flesh. If there was any difference between the lots, it was in favor of lot 3 for making the great gains. These horses were of equal individuality and merit with the other two lots and they had the advantage by being slightly thinner in flesh, so you see the experiment was really planned in favor of the timothy hay horses. Those in lot 2 at the beginning of the experiment were the heaviest of all the horses, the difference here being due to these horses carrying more flesh than those of lot 1 and lot 3. This table also shows that the total feed consumed per horse in eighty-four days for lot 1 to be as follows: Corn 1,483 pounds, bran 199 pounds, oil meal 34 pounds, clover hay 1,164 pounds; lot 2 consumed 724 pounds corn, 724 pounds oats, 203 pounds bran, 34 pounds oil meal, 1,154 pounds clover hay; lot 2 consumed 704 pounds corn, 697 pounds oats, 217 pounds oil meal and 1,234 pounds timothy hay. From this you will see that the horses getting one-half oats, one-half corn and clover hay made much the largest gains, the lot getting corn and clover hay made next to the largest gains, while those receiving one-half corn, one-half oats and the timothy hay made the smallest gains.

Dividing these results by 84 you will see that lot 1 made an average daily gain of 2.29 pounds per horse; lot 2, 2.98; and lot 3, 1.88. In regard to the quantity of feed consumed, you will notice that there is but little difference and practically none between lots 1 and 2, while lot 3 consumed slightly less grain and a little more hay.

There was also quite a notable difference in the finish which the horses in the different lots took on. The horses in lot 2, receiving the corn, oats and clover hay, took on a considerable better finish than those in lot 1, which also took on a better finish than those of lot 3. The horses in lot 3 seemed never to belly down as feeders like to see them. They always looked more or less gaunt and never gave the appearance of being well filled. The total average weight increase per horse in all the lots was 191 pounds and the total average increase per horse in value was $48.53. From this we can calculate that the additional flesh on these horses was worth 25.4 cents per pound.

The next chart gives a financial statement of the profits made, based on pounds of gain.

FINANCIAL STATEMENT.

LOT I.

RECEIPTS.		
By 192 lb. Gains at 25.4 c		$48 77
EXPENDITURES.		
To 1,483.4 lbs. corn at 35c	$9 27	
198.7 lbs. bran at $20.00	1 99	
34.3 lbs. oil meal at $27.00	46	
1,164.5 clover hay at $8.00	4 66	
Total cost of feed		16 38
Profit per horse		$32 39
Cost per pound gain, 8.5 cents.		

LOT II.

RECEIPTS.		
By 250 lb. gains at 25.4 c		$63 50
EXPENDITURES.		
To 723.84 lbs. corn at 35c	$4 52	
723.84 lbs. oats at 30c	6 79	
202 6 lbs. bran at $20.00	2 03	
34.1 lbs. oil meal at $27.00	46	
1153.7 lbs. clover hay at $8.00	4 61	
Total cost of feed		18 41
Profit per horse		$45 09
Cost per pound gain, 7.4 cents.		

LOT III.

RECEIPTS.		
By 158 lbs. gain at 25.4 c		$40 13
EXPENDITURES.		
To 704 lbs. corn at 35c	$4 40	
697.1 lbs. oats at 30c	6 54	
217.2 lbs. bran at $20.00	2 17	
34 lbs. oil meal at $27.00	46	
1,234.1 lbs. Timothy hay at $9.00	6 79	
Total cost of feed		20 36
Profit per horse		$19 77
Cost per pound gain, 12.9 cents.		

From this it will be seen that the total cost of feed per horse in lot 2 is somewhat more than that on lot 1, due to the fact that the grain part of the ration contained one-half oats which were more expensive than corn when rated by the pound, but the rapidity of gains made in this lot more than offset the additional expense, thus making this ration the most economical of the three. The ration in lot 3 cost $1.95 more per horse than that of lot 2, and gave decidedly less gains than that of lots 1 and 2, so that the cost per pounds of gain in lot 3 was nearly 13 cents, while that of lot 1 cost 8.5 cents and that of lot 2, 7.4 cents.

If gains can be made for 8 cents per pound in cattle feeding it is generally considered that they are doing very well. From this you can see that the horses in lots 1 and 2 made economical gains, while those in lot 3 were somewhat expensive, yet considering the value of flesh when put on the horses worth 25 cents per pound, the gains even in this lot were profitable.

Summing up these results, then, I think we may say, judging from this experiment:

First—That a mixed grain ration of corn and oats, when fed with clover hay is more efficient than a single grain ration of corn for producing large gains.

Second—While a ration of corn, oats and clover hay is more expensive with prices of feeds as stated than one of corn and clover hay, the gains are such as to make its use more economical.

Third—A mixed grain ration of corn and oats when fed with clover hay is more efficient for producing gains than where fed with timothy hay.

Fourth—A ration of corn, oats and timothy is not satisfactory for producing finish in fleshing horses for market but may be materially improved by the addition of oil meal.

In a later experiment which we conducted a year ago, we purchased 24 thin feeding horses and divided them into four lots. At the beginning and end of the experiment we had them appraised by a committee of expert horsemen, as we had done the previous year. I wanted to find out, if possible, what effect the bran had on the horses receiving clover hay, so I fed one lot on straight corn and clover hay; another lot on one-fifth bran, four-fifths corn and clover hay; the third lot on one-fourth oats, three-fourths corn and clover hay; and the fourth lot on one-half corn, one half oats and clover hay. While we do not have the results of this experiment in tabular form, generally speaking they are as follows: The horses receiving one-fifth bran with corn and clover hay did not make any better gains than the lot receiving straight corn and clover hay. In fact they were practically equal. The lot receiving one-fourth oats and three-fourth corn made slightly more gains than those receiving all corn and clover hay. The lot receiving one-half oats and one-half corn made practically the same gains as the lot receiving one-fourth oats and three-fourths corn and clover hay. From this we may judge that some oats when added to the ration are beneficial, but the exact proportion we do not know, presumably somewhere between one-fourth and one-half oats. My judgment would lead me to believe perhaps about one-third oats and two-thirds corn.

One-half the horses were stabled in box stalls and the other half in single stalls, tied up. The horses in the box stalls in three months made five pounds more gains than those in the single stalls tied up, which is not enough to justify the expense of additional stabling. So far as I could determine the health of the horses in the box stalls was not any better than that of those in the single stalls.

I also wanted to find out the effect of exercise upon horses when trying to put flesh on them. I had some of the horses walked three miles daily, while the others received no exercise at all, except such as they got from walking to and from the scales and what they naturally would take in their stalls. The horses receiving the exercise made approximately twenty-five per cent less gains than those not having the exercise and so far as I could determine remained in no better health, so you will see it was a decided loss by giving the exercise.

The results of these feeding experiments will be tabulated and put in bulletin form so that you can get them.

Delegate—How did you feed these horses? Tied up, or loose in a box stall?

Mr. Obrecht—They were tied up in single stalls, without any exercise. The only exercise they had was when they were led to the scales, not more than three or four rods, and back to barn again.

Mr. Goodwin—Would these horses have done any better if they had been exercised?

Mr. Obrecht—No.

G. W. Cress—While in my mind there is no question there is more profit in feeding clover hay and an animal will fatten rapidly, and more profit in fitting him for market, but in your experience, would you consider it advisable to continue feeding clover hay? Isn't it a fact that clover hay will make him heavy, and timothy hay will be more preferable?

Mr. Obrecht—I can only give you my opinion without any facts to base it upon. I expect to experiment this summer in regard to feeding work horses, and next year I can answer your question. I have fed both timothy and clover hay and I have produced heavy horses with both of them. It depends largely upon the quality of the hay, and upon the judgment of the man that feeds it. Any horse that will eat too much hay, regardless of whether it is timothy or clover, and especially if that hay is dusty and damaged, it is likely to produce heaves. Timothy will produce it. The only safeguard about timothy hay against producing heaves, is that it is not as palatable as clover and horses will not eat it as well. I think that most men feed horses too much hay. When feeding a work horse one ought to limit the amount of hay he eats. He should be given all he ought to have, but no more. I think the average horse eats too much.

Delegate—What is the value of clover or timothy hay for hard labor? Which is more valuable, or is either more valuable?

Mr. Obrecht—I can not answer the gentleman's question, because I have no direct figures to base an answer upon. My opinion is that one can keep his horses in better condition if they get some clover hay. Just how much I am not prepared to say, but I believe that at least part clover hay is better than all timothy hay.

Delegate—About how much clover hay per day did they eat?

Mr. Obrecht—The horses varied. I fed them all the clover hay they wanted. I started in rather light and used about three weeks getting them on full feed. They were started at about 12 pounds and went up to about 20 pounds maximum. An average daily ration of a horse would be about 18 pounds. He would eat that about two months. During the last month when he was about fat, if he ate 12 or 14 pounds he was eating an average amount of hay.

Delegate—When you fed these horses, did you feed them all that they would eat?

Mr. Obrecht—All the hay they would eat, and all the grain after about three weeks. I never allowed them to leave any grain in the troughs. I I always made them come back hungry.

Delegate—In feeding your horses, did you find that after you fed a few months that some of them would not gain any at all?

Mr. Obrecht—I did not find that true with any of the horses that were in what I would say normal condition. Last winter I had that experience with two horses. For some reason, after the first month they stopped and they did not gain anything at all. Those horses I simply said were abnormal and threw them out.

Delegate—Were the horses groomed?

Mr. Obrecht—They were not groomed, except about the last week. I find it is not the practice of horse feeders to groom horses while in the barns.

Mr. Goodwin—Most of the horses were four to six years old?

Mr. Obrecht—Yes. There was one or two seven years old and nothing less than a four-year-old.

Delegate—Do you recommend blanketing them?

Mr. Obrecht—I did not blanket them. It is not necessary if you have a well ventilated barn.

Delegate—Did you feed them three times a day?

Mr. Obrecht—Yes, morning, noon and night. I also watered them three times a day. I first started in to water them five times a day. I thought, perhaps, the more water they would consume the better they would do. Generally speaking if I can see how much water a horse is drinking, I need not see anything else and can tell which horses are making the largest gain. I found they did not consume any more water when given them five times a day than three times a day.

Delegate—Was the chill taken off the water?

Mr. Obrecht—No, it was ordinary tap water that came through the ground.

Delegate—How would it be to turn a horse out on pasture?

Mr. Obrecht—That sometimes is very desirable. I have tried pasturing horses at night but do not like it. It causes too laxative a condition. A little grass is good for a horse, but I think we should not leave them out over Sunday to fight flies.

Delegate—Don't you think, professor, that turning a horse out at night on light short pasture is better for him?

Mr. Obrecht—I question whether it is better for him. In his work he has all the exercise he needs during the day. After consuming his feed he should lie and rest instead of chasing around.

Delegate—I think it is the practice among farmers. I do that myself. I always have a short pasture. It always seemed to me that they came in fresher, the skin and hair are fresher, and the old sweat off of them, and they look a good deal nicer than when kept in over night.

TUESDAY AFTERNOON.

North Side—Main Floor.

Director E. W. Burroughs, Presiding.

Professor Crane will now address you on the subject "Cement Construction for Agricultural Purposes." I would like to say that when Professor Crane gets through speaking that we would like for those asking question to give their names and location.

Cement Construction for Agricultural Purposes.

(By Prof. Fred R. Crane, of the University of Illinois.)

I talked upon this subject at Quincy and I have a few additional things to present to you here.

FRED R. CRANE.

Cement as its name implies is a substance for binding together fragments of materials. For our purposes we shall assume that these materials will be sand, rock, and gravel of certain fineness and purity, and used in their proper proportions.

WHAT IS A PROPER CEMENT?

There are two kinds of cement in general use in this country, Portland cement and natural cements. As to what shall be included under the name of Portland Cement, opinions vary somewhat, but all agree that there must be a thorough mixture consisting "essentially of calcareous and clayey substances." The burning of this mixture is an important step in its manufacture, and must be carried to "a point just short of vitrification;" an underburning of the mixture will be shown by yellow streaks which appear in the finished product, and such cement should be rejected. After thorough burning, the clinkers formed are transferred to a grinding mill and there ground to the fineness of flour. This extreme fineness of the cement is a deciding feature when the strength of the concrete mixture is considered.

A SLAG CEMENT

closely resembles Portland cement in its properties, but its general make up is very much like the natural cements. It is made up of "products obtained by intimately and mechanically mixing without consequent calcination, powdered hydrates of lime with natural or artificial materials which generally do not harden under water when alone, but do so when mixed with hydrates of lime, the mixed product being ground to extreme fineness."

Most authorities agree that the slag cements will not give the results such as are expected of Portland Cements when exposed to the weather or to sea water, although much satisfactory work has been done with slag cements.

THE NATURAL CEMENTS

are made from natural rock deposits and their characteristics differ as the deposits differ. They are usually a quick setting cement and are lightly burned. They have a lighter color, are slow to gain strength in setting and are not generally used where the weather can attack the concrete.

The Portland cement is best and should be used where first class work is required. There are many different Portland cements in the market and all are giving general satisfaction, although some are quicker than others in setting. When you have learned the working characteristics of one cement, it is best to continue using it.

A GOOD SAND

should be sharp and not too fine. There must be no dirt or organic matter in it. To test for dirt or organic matter, rub it in the hands where no dirt should appear, or place in a glass jar with water, and after mixing, allow it to settle. Should any appreciable amount of deposit appear above the sand, it is doubtful if such sand should be used. A first class sand may be made up of coarse and fine grains mixed, provided it is free from dirt; it may contain small amounts of clay and no harm will arise, but the sharpness of the particles is generally conceded as best.

For best results, use a dry sand, and if necessary submit it to a drying process, because cement when applied to a wet sand takes up the moisture quickly and will form into little balls, causing weakness in the finished concrete.

CRUSHED ROCK.

Crushed rock is largely used in concrete construction. The best materials come from hard tough rock which is crushed and screened to the commercial grades known as 1st, No. 2 that which is too large to pass a 1½ inch hole and small enough to pass a 2 inch hole; and, No. 1 which will pass through a 1½ inch opening, but from which the screenings are taken; 3d, screenings, which are of the same size as the usual run of sand, and used to take the place of sand. For making the strongest of concrete mixtures the screenings should be separated from the crushed rock before mixing to guard against pockets and irregular proportions, and if the screenings are to be used, the cement should be mixed first with them, afterwards adding the stone.

In all practical work it is well to wet the stone a few hours before using, because dry stone will take moisture too rapidly from the cement mortar.

GRAVEL

makes a good aggregate when it is clean and in which the proportion of sand and rock will run, when screened out, in a ratio of about 1 part of sand to 2 parts of rock. The large stone should be discarded or crushed before using.

The great variation found in the particles of the gravel allows a more compact material and as a consequence there is a greater reduction in the voids, which however is no argument favoring gravel. The amount of cement used with any grade of gravel will be determined largely by the ratio of sand which makes up the gravel.

In speaking of voids we have reference to the air spaces within any given volume of material; as an example, if we were to take a ten gallon can and fill it with marbles, all of a certain size, we could put four gallons of water into that can and the can would contain both marbles and water, but the water will fill the voids between the marbles.

The voids in crushed rock of the No. 2 grade will amount to about 45 per cent of its volume.

Sand that runs fairly even in size will be about 47 per cent voids while sand composed of both fine and coarse particles will run lower in per cent of voids.

In making up our different mixtures we consider carefully the question of voids, and endeavor to use sand and rock in such a proportion that all voids are filled, depending entirely upon the amount of cement used, for the strength of the concrete.

When using gravel it should be tested so that one may know the exact proportions of sand and rock and use accordingly.

There are four recognized mixtures known as:

1. Rich, which uses 1 part of cement, 2 parts sand and 4 of crushed rock.
2. Ordinary, which uses 1 part of cement 2½ parts sand and 5 of crushed rock.
3. Medium, which uses 1 part of cement, 3 parts sand and 6 of crushed rock.
4. Lean, which uses 1 part of cement, 4 parts sand and 8 of crushed rock.

It will be noticed in these mixtures that in each case the rock is just twice that of the sand in volume.

MIXING OF MATERIALS.

These materials may be mixed by hand or with a machine mixer. To obtain the best possible results with concrete the cement and sand are first well mixed, then wet and mixed to the constituency of mortar; the stone is then added and all thoroughly mixed, the complete mixing of all the materials being the factor which decides the strength of the concrete.

Theoretically the cement gathers around each particle of sand, the extreme fineness of the cement allowing this to occur. This mixture of sand and cement fills the voids in the rock aggregate, giving us the greatest strength possible. Too much stress cannot be laid upon the thorough mixing of all materials.

Practically we usually mix the stone, sand and cement dry together, adding the water after mixing and then mixing again ready for use. The matter of mixing is a practical detail which the average person can solve for himself.

Concrete mixtures are used with and without surface dressings. The surface dressings are applied to walks, floors and where a smooth surface is desired. When this is done the under layer is mixed of the cement, sand and rock, and over this a thin layer of cement mortar (varying in thickness from ½ inch to 1 inch) is spread and usually troweled smooth.

Concrete will not resist entirely the passage of moisture, although the richer mixtures will hold fairly well.

To resist moisture in basements there should be a water proofing material added from the outside or below as the case may require.

MAKING A WALK.

This illustration shows you a section of a walk projected. In cooler climates where water stands in the soil, one should excavate for a sub-foundation, varying from a few inches to 1½ ft. Fill this with cinders or gravel to within about four and a half inches of where you desire the surface of the walk to be.

Use 2"x4" scantling for forms at the side and fill in about four inches of concrete mixed 1-2½-5 or possibly 1-2-6, wet until it begins to be mushy. Spread a surface layer ½" thick made up one part of cement and two parts of clean sand wet to the constituency of mortar.

Strike off this top layer with a curved surface leaving the walk about ¾" higher in the center of a 4′ walk for drainage. Care should be taken to spread the top dressing over the lower layer before the lower layer has time to set, say inside of twenty minutes, in this way we get a good bond between the two.

CUT THE WALK IN SQUARES.

To care for the expansion and contraction under heat and cold, the walk should be cut through both layers, leaving the finished walk in rectangles about four feet long. It will not be enough to simply cut the top dressing, the cut must be made entirely through both layers. In smoothing the surface do not trowel it too much, as it causes separation of the cement and sand, and a subsequent loss of parts of the dressing.

Concrete for fence posts is now attracting considerable attention, and that we might discuss this intelligently, let us look at it from the theoretical and practical standpoint.

CONCRETE FENCE POSTS.

If we were to discuss a fence post purely from the theoretical standpoint, it would be well to say that the cross section of a concrete fence post should have 1½ per cent of its cross section reinforced with steel of as high a point of elasticity as it is possible to obtain. The greatest strain upon a post comes at right angles to the fence and not longitudinally with it. This being true, we must provide the post with its greatest power of resistance acting at right angles to the fence. Theoretically we increase the strength of any post or beam, which sustains a greater amount of resistance from any one direction, by giving the post or beam a rectangular shape, with a width on one face practically .65 of the width of the other face. Any post or beam varies in its power to resist directly with its width and as the square of its depth. Following this theory further we find that we can reduce the size as we go towards the top, giving us a tapering post.

For building work and with beams we use enough reinforcements of steel to carry the load depending entirely upon the concrete for compression stress. In beams we put the steel reinforcement on the lower side, while in the fence we must use it upon at least two faces.

The fence post No. 1 which is 6"x6" at the base and 4"x6" at the top should be reinforced ¾" in from each corner with a No. 9 steel wire. In place of this steel wire we sometimes use a ¼" square rod, twisted, which is of course somewhat stronger, but costs more money. One cubic yard of concrete will make sixteen of these posts. The theoretically perfect post No. 3 made of concrete, would be one that was 4"x7" at the base and 3"x5" at the top, reinforced with three ¼" steel rods upon each of the smaller faces; making thus six steel rods in each post. This would give us approximately 1½ per cent of the cross section of the post constructed in steel, and is close to theoretically correct, if we consider that our construction is of the best, and that our steel rods are not defective. In our loose soils a 4" face is not enough and from this standpoint there is serious objection to this latter form.

In post No. 1 6"x6" at the base and 4"x6" at the top, and reinforced at each corner, we are not using enough wire to equal the theoretical requirements. Since this post is strong enough we can approximately retain our strength, and could reduce the amount of the concrete in the post by making one which is hollow in the center and putting an inch face on each corner. The chipping off of the four corners of a fence post is a saving in the material, and in so far as strength is concerned, there is no appreciable difference. This construction reduces the amount of concrete used, so that when we put a ¼" steel rod at each corner, it gives us a post that more nearly approaches the proper relationship, which should exist between the amount of concrete and the amount of steel found in the post. The post No. 2 made 6"x6" at the base, 4"x6" at the top, with a hollow three inches at the base and two inches in diameter at the top and with an inch face on each corner seems to more nearly approach the ideal post. From the one cubic yard of concrete twenty-one posts can be made, while if we make them solid, we can get only sixteen, as stated above. The material used in making the hollow posts will cost about 30c for each post when using the 1-2-4, which is recommended. These figures allow $1.75 per cubic yard for crushed rock, $1.50 for sand, $2.00 per barrel for Portland cement, and 8 cents per post for reinforcements of No. 9 steel wire.

Number 4 another form of post is 4"x4" at the base and 4"x4" at the top with ¼" steel rods in each corner with an inch face upon each of the four corners and with a hollow through the center 2" in diameter. One cubic yard of concrete will make forty-five such posts, and the theoretical relationship between the amount of concrete and the amount of steel in the cross section is approximately correct. This form of post has not been tried, and while we are inclined to believe it is a form which will not give satisfaction, we, however, have no practical tests upon which to base our judgment, further than the fact that there is insufficient bond.

In planning the reinforcements for posts it must be remembered that the theoretical conclusions demanding 1½ per cent of the cross section to be of steel, for loaded beams, and for posts it is felt that it is not necessary to furnish more reinforcements than are shown (a No. 9 wire in each corner) and which equals only ⅛ as much as the theoretical figures would require of steel.

METHOD OF FASTENING WIRE TO POSTS.

There are several methods of fastening fence wire to concrete posts, most of them more or less unsatisfactory. To wire around the post is troublesome and requires considerable wire. To use wire staples in any form solid in the post is unsatisfactory because they rust off and break in time. A casting with an enlarged head has been used, and pushed into this is an expanding steel staple spring which holds the wire. This is a rather satisfactory method, but expensive. There is no danger of the casting giving out while the staple is easily replaced.

We have lately tried a new method made possible by using a hollow post. When making the post we place the form in such a manner as to leave slotted openings to the open center upon one side of the post and by using spring steel staples we easily fasten the wire.

W. E. Braden—Is there danger of water getting in the hollow post? A. We fill the top with cement and if water should get in it drains out below.

Q. Have you used that? A. Yes, we have used this in our labratory and found that we could break lots of it.

Q. If the ground is face full of water would it?

A. If the ground was full of water the water would go through the cement. It would soak up but would not go on it and stay on the inside. You would have no trouble with that. I am glad to answer you that we do not use this post in the field but it is a post that we have broken in the labratory.

Mr. Smith—The theoretically perfect post would be 6"x6" at the bottom and 4"x6" at the top, has this been tried?

It is somthing I am glad to call your attention to. We have a wooden center, a rough wooden center. It is prepared and we fill it before it is thoroughly set.

William Wringle—What is the weight of this post?

Prof. Crane—I have those weights but I cannot remember them.

Q. In the neighborhood of 45 pounds? A. Yes; it is more than that. My estimate would be 75 to 80 pounds.

Mr. Abbott—What does a cubic foot of cement weigh? A. I cannot tell you about that. Does any body in the audience know?

Delegate—I made some 6½ feet long 5"x6" at the bottom, 3½"x5" at the top and they weighed 146 pounds.

Prof. Crane—What was the size?

Delegate—Six and a half feet long and weighed about 140 pounds apiece.

Prof. Crane—That did not have a hollow center?

Delegate—No, sir.

Prof. Crane—I would suggest that according to those figures that they would weigh between 75 and 100 pounds.

Mr. Hoyt—I would like to know what is the strength of that as compared with our white oak fence posts?

Prof. Crane—The wood posts will stand more punishment than concrete.

Mr. Louden—How about the wire. You know they expand. Another thing about how far apart, the same as ordinary wood posts?

Prof. Crane—Yes. That point about the wire. Wire has elasticity. You take forty rods of fence and you can stretch it enormously. These wires you put in the posts should have the greatest resistance to expansion. I should like to ask the gentleman back there why do you make a post six and a half feet long?

Delegate—That is about what we use. That is what we need.

Prof. Crane—Seven and a half feet is the length of ours.

Mr. Oldfield—We find that cutting down the posts to six and a half feet will answer our purpose. We put in our staples and use 39 inch woven wire and that gives us a four foot fence which keeps horses, sheep and cattle and makes a fence that is durable and it does not cost as much.

Mr. Black—Do the reinforcements rust?

Prof. Crane—Iron, steel or wire put into concrets will never rust.

Delegate—It is said by some that barbed wire makes the best reinforcements?

Prof. Crane—Yes, sir; but it is simply stronger. As it is some barbed wire has been put up so long it is practically rusted in two and if it was put into a post it might be rusted so it would break off, but fence wire has been used satisfactorily.

Delegate—There are some that say they have used fence posts without reinforcements?

Mr. Black—If you have no use for a fence it will do all right.

Prof. Crane—That is a pretty good answer. If you have not much use for a fence it will answer. That is rainy day work for the hired hand.

The farmer will find many places for concrete construction on the farm; foundations under his sheds and corn cribs, feeding floors for live stock, water tanks, tile, etc., and the greater his ingenuity the more things he will use it for.

In conclusion we would recommend the use of Portland cement; a clean, sharp sand, and a tough crushed rock, or, in place of the sand and rock, a good clean, sharp gravel is satisfactory. Use the proper proportions according to the strength desired and be sure the mixing is thorough.

E. W. Mitchell, of Whiteside Co.—If you have a good concrete floor you do not get a waste from the manure?

Mr. Yokins, of Cass Co.—Does the floor without a top dressing hold the liquid without going through?

Prof. Crane—Yes, if you have a 1-1½-4 mixture. Don't get a mistaken idea that water goes through and leaks out. I simply mean that if you had a floor in use and did not smooth it over it would absorb moisture.

Delegate—I have a floor I am feeding hogs on that is splendid and is the most satisfactory thing I have used. I have two cement water tanks ten feet square and they are satisfactory.

Prof. Crane—You could make them round if you wanted to. In concrete there is no limitation as to what you can make.

Delegate—Do you recommend concrete for floors of corn cribs?

Yes, by all means, if you have all the under portions drained out, then you will have no detrimental results.

Mr. Pervier—I have this year built a double corn crib with a concrete floor but all the neighbors say that all the corn on the floor is going to spoil.

Prof. Crane—No, sir; your corn will not spoil if you have the floor put up on the sides.

Mr. Scrantz—I have a corn crib with a concrete floor. I built it four years ago and have never had any corn spoil in it. In Christian county they are now building fifteen or twenty corn cribs and it is all right.

Question—How high do you put the floor from the ground?

Answer—About six or eight inches.

Prof. Crane—Just high enough so the water won't flow into it.

Mr. Pervier—I took part of my concrete floor for an oat bin and I found about an inch of spoiled oats on the bottom, but the concrete was not thoroughly dried out when the oats were put in.

Prof. Crane—You put it down pretty quickly?

Mr. Pervier—Yes, sir.

Delegate—I want to ask if the oats were in good condition when they were put in on the floor?

Prof. Crane—When you dry concrete be sure and sprinkle it; sprinkle it over a period of six to ten days, because it does not dry from the outside; it dries from the inside out and it should not have too much exposure.

There is one thing more about using concrete in cold weather, you can use salt in the water and reduce the temperature, but you would not want to use concrete when the temperature is ten degrees below freezing. It has been done but it is not to be recommended.

Judge Humphrey—What effect do concrete floors have on stock, on young animals, say on farrowing sows?

Prof. Crane—We have a concrete floor in our breeding pens and Prof. Dietrich tells me it is satisfactory. We also have used brick and he tells me that it costs a little more to put in concrete than brick. That is the extent of our work with hogs, but you want to bed them and it is all right.

Delegate—There is a notion about it being too cold.

Answer—You need not worry about that, it will take care of itself.

Mr. Sidney—About how long should the posts be made before they are used?

A, Three or four days.

Mr. Warner, of Mason county—If you could use one part cement to one of sand, that would be better?

Answer—Yes, sir; very much.

Mr. Cunningham—Do you recommend reinforcing floors or walks?

Answer—No, sir. The theoretical theory is to stand a column on the end, you can load it tremendously. Now, if you turn that column around and put the load in the center it breaks in the center. Now, that must be in the lower part only and about an inch from the lower edge; that is our method of building bridges and reinforcing from the lower edge.

Mr. Scrantz—In building walls you reinforce?

Answer—You make it flat. You will be surprised by making it two inches in thickness.

Delegate—I have got mine covered that way.

Prof. Crane—What size wire?

Answer—I just used barb wire.

Prof. Crane—That is an awful good thing.

Mr. Rich, of Union county—In the reinforcing of bridges that run across the way it is travelled how are the ends of the wires fastened?

Answer—Turned over.

Question—About how far down?

Answer—Generally run down five or six inches, just so they are down. Some are as low as two inches.

Mr. Abbott—I would like to have you tell how you use cement for roofing?

Prof. Crane—I have never built any roofs, but you can build a cement roof over a small place. Maybe you don't smoke but you can build a smoke house of concrete and put on a cement roof over the top.

Now, about shingles. There is a patent. I noticed a house near Antioch that has hollow walls. He built it himself at a cost less than $300. He built cement shingles and put them down on one layer of boards, but there is one thing you want to do, you don't want to put the boards down and build solid, there would be dry rot. Make the openings large and put in the side timbers. That is a good thing to remember.

Mr. Nash—Do you know of any concrete silos and how they are built?

Prof. Crane—Dr. Hall has one built with hollow walls. There are several concrete silos that are giving satisfaction.

Delegate—Did he build his with hollow walls?

Prof. Crane—He built his with hollow walls. I am sure that is right. The reinforcements would depend on the requirements of the walls for strength. You don't depend on the concrete only for the strength of the reinforcements. If you have a silo and put in concrete walls you can make those walls less than five inches, maybe four, and they would hold, but we advise five and six inch walls.

Mr. Miller—How do you put the wires in your posts?

Prof. Crane—We build our posts laying down. We have different forms we use, 1x6 in making. We make them four inches and six inches and lay several of them and put three-quarters of an inch of concrete and lay in the ends and put in concrete for awhile and leave a hollow center and fill again. Now, we have to be careful to have plenty of filling in below, because if we don't the center will hollow up and the post will have a tendency to crack on the side it lays.

Delegate—On a clay floor in a barn if you have a clean floor would it be necessary to put cinders under the cement?

Prof. Crane—It might not, but I would advise you to put two inches of cinders upon it. In laying pavements we put a layer of sand on it. You may not have to do it. It may last and last always.

Mr. Cole, of Henry county—In the northern part of the State, where we feed a great many cattle, the great question is some thing to take place around our feeding troughs and watering tanks. If we could put something fifteen or sixteen feet around the feed troughs and water tanks and cover it, that would be a great advantage?

Prof. Crane—In the case referred to—that is, right around the water tanks it is always muddy and the cattle tramp it up, you would want to put down a good foundation. I would recommend that you put down a little cinders and put on five inches of concrete and put it in place as rapidly as possible.

Delegate—What is the largest sized gravel you use?

Prof. Crane—Three inches in diameter for floors, but where you want extra strong, two inches. In walls outside you might use it six inches.

Now, gentlemen, our time is up. I would like to say this: I have been fighting the grippe for about two weeks. I got up out of bed to come over here. If you will write me at the university I will answer any questions I can, and I will send you all the information I can. We would be very glad for you to do it. It is your right to do it. We are your paid servants. We are working for you. It is not your privilege, it is your right. If there is not enough of us there now to attend to your business we will have to get more men.

Adjourned.

EVENING GENERAL SESSION — FIRST DAY OF INSTITUTE.

TUESDAY, FEBRUARY 11, 1908, 7:30 P. M., COLISEUM.

U. S. Stone, County Superintendent of Schools, Peoria county, Presiding.

Chairman—We will open the program this evening with music by the Peoria High School Orchestra.

Music. [Applause.]

Chairman—The first address will be "Kindness to Animals—Its Money Value," by Prof. Joseph Carter, Champaign, Ill. [Applause.]

Prof. Carter—*Ladies and Gentlemen, Farmers of Illinois, and Friends*—I have given to the stenographer my manuscript. Now, for fear that I will not speak what I have given to her, or that you would be able to recognize the difference, I have some notes that I am going to try and follow, so that I may keep the discussion as near as I can to what I have written and handed in, so that when you read it next year—which you never will, of course, [laughter] you will not say, "He never said this. This is smarter than what he said."

Well, not a great many centuries ago, the most of our ancestors were barbarians. We have improved a whole lot on them, I know. [Laughter.] They were without local habitation, living largely in the woods, and by the rivers and streams, subsisting upon fish, berries and nuts and by the products of the chase. At first they had not learned to tame the animals, but in the course of time a few of the wild animals about them were domesticated, in the first place probably for playthings for the children, and then others likely for company—and rather pretty good comany too, for some people they would be, and finally they learned to use the animals and appreciate their value as food, clothing and shelter. Then a pastoral life began.

Then, after a while, a great while, when in his upward development man became wise enough to use the strength of the horse and ox, and to teach them to draw a load, when he found that either of them could, as a draft animal, do as much work as ten men, and that by using one of them man could increase his productive power ten-fold, and by using two, twenty-fold; and finally, when he learned how to teach four or six of them to work in unison, together, then man had increased his working efficiency forty and sixty-fold respectfully. Then he became able to produce more food than himself and family required, and he also had the means of transporting the surplus to considerable distances. Then commerce began and civilization grew.

The money value of the domestic animals of the United States, according to statistics, exceeds three billions of dollars. What part of this value comes through their domestication cannot be accurately stated, but it would be a very large part, as you can fully realize when you come to think how valueless would be all the horses if at once they were to return to their original state as wild horses, absolutely untamed, or if the cattle and the swine and the chickens even, were to be so changed to the condition, the nature and the disposition of wild creatures, denizens of the forest and of the plain. So, it is apparent that very much of this value, probably more than fifty per cent of it has come from our domesticating them, and through the kind treatment which their ancestors have received, which has changed their disposition so that it has become inherited and also strengthened by continued kind treatment.

DISPOSITION AFFECTS VALUE.

All who handle farm animals know that their value is affected by their disposition. This disposition comes from the state of the animal's mind; and the state of his mind towards us depends upon how we are treating him, whether kindly or cruelly. By kindness he is made trustful, fearless and docile; by cruelty, suspicious, fearful and intractable.

ANIMALS HAVE MINDS.

That animals have minds is a fact that all who have to do with them should realize. They are not like the machinery of the farm, which, if a man neglects and misuses, hurts only his pocketbook, but if he neglects and misuses his animals, he not only injures his pocketbook, but does himself a more grievous wrong. There are many people who do not realize at all that animals have minds. That is, I mean they think of the animals about them as if they were their farm machinery, their wind-mill, or other things on the farm. Sometimes you know, even a wind-mill runs away, but then they think of a horse as having as little mind as that, or the cattle, or the other animals of the farm. Now, animals have minds, and in a large sense their minds are not unlike that that we have, that we are possessed of. They have many traits in common with us, many emotions, many of the faculties of their minds correspond with ours and are cultivated, developed and strengthened as ours are.

ALL ANIMALS HAVE MINDS.

First, I might say, all animals have memory. They can remember. I know some of you are sorry that your horse can remember, but he can. He can remember! So can the cow. Some of you know that. So can almost everything that is about us. All animals have memory. Sometime, probably, there will be written a psychology of the lower animals, as there is now of the highest animal, man. Nobody has done it so far, but there is ample material for it, and it would be a good study for some people, a most profitable one for all engaged in animal husbandry.

Now, I said that animals have memory. They can remember very, very many things. They can remember where to get food and drink; they can remember the time when it is time to feed them, and they will call for you. They can remember when it is time to quit at noon—they won't miss it, many of them, by one hour, before they will let you know it is time to quit work. They remember they got about so hungry yesterday, or they will remember some other things by which they can tell about it. They know, I say, where they are comfortable, where they have been fed; they bear in mind things that have been done to them, and often the fellow who did it. They remember very many of the incidents of life, and of the sensations. They remember where they were frightened, they remember where they were beaten, or injured, possibly. They do love their homes, and they remember where those homes are. Often when taken from their home they will travel long distances, climb and cross high mountains, swim wide rivers in order to get back to their home. It is pitiful to see, sometimes, if you have handled animals, when you have brought them onto your place, a nicer place than they came from, of course [laughter] a good deal better, and yet to see how they will stand and look toward home, and long to go there. Why, it is almost pitiful! Except seeing a homesick woman, the most pitiful thing I know of is a homesick horse. [Laughter.] Well, it is no laughing matter to see a homesick woman. Oh, it is another matter for you to laugh, but you won't laugh when you get homesick. You never were homesick, of course. Oh, *I* have been. I have bought horses, and when I brought them away and put them into a good pasture, and saw them stand there for days—I don't mean a day at a time, or a half a day, but days. They would stand at the corner nearest toward their home, stand and look away, and away, and away, back to their home where they had come from. *Memory*, you see, is so strong over them. Then, there are many other things.

They have curiosity, especially the young, and will examine a new object with great care, looking at it from all sides, and from various directions; they will smell of it, taste of it, and with their sensitive lips, feel of it. They seem to enjoy acquiring knowledge.

They are sociable. To them there is pleasure in the society of others of their kind, hence they go in herds and flocks, and even sometimes they show great pleasure in the companionship of animals belonging to an entirely different order from their own; for example, a horse and a dog have been known to be very congenial companions, also a cow and a pig.

They are capable of forming habits, and the great law by which their habits are formed is the one by which man forms his habits—*repetition*, and they, like man, are bundles of habits.

They have their likes and dislikes. Some horses like certain horses, and there are some horses they do not like at all. Some horses work very kindly with others, then there are others they won't work with at all. There are some things they like to do, some things they enjoy doing, there are some things they won't do and you can't make them. Then it is time to quit, because you will have a balky horse if you don't quit. And there are many other characteristics. Cows like certain men to milk them and for them, of course, will give their richest milk and in largest quantity, while for others they will "hold up" their milk. There are some men that a good, sensible cow won't let milk her at all, but will just kick them over and have nothing to do with them, because she don't like them. Well, generally, nobody else does, either. [Laughter]. That is the rule with such fellows. Showing that these are not blind and senseless whims, but both the likes and dislikes had their origin in some previous experience which formed a reasonable basis for the manifested love or hatred.

They have individuality. I say they have their likes and dislikes. They have also their individual characteristics, or, I might say, personality, or individuality, if I wanted to use a great, big word, this is just what we might call them, cowality, horseality, or chickenality, or something of that sort. [Laughter]. You never knew two horses exactly alike in their disposition, even though they may very closely resemble each other in appearance; you never knew two horses exactly alike to drive, handle or work. You never knew two cows to be exactly alike in regard to the things they knew, and their response to the treatment they received. They may look very much alike, and yet the thoughtful and observant dairyman will know that in minds they differ widely. You hardly ever knew two pigs alike, unless you got them awfully fat, and then they will just enjoy life so well they won't care "whether school keeps or not," so it don't make much difference to them; they may be very much alike when they get in that condition, but otherwise than that they have a strong individuality that makes them very different from all others.

But I had forgotten. I am going to try to follow that story that the stenographer has down there.

FEAR.

Now, the one thing, the one thing which we have done the most in is in overcoming their fear. Fear, you know, is a painful emotion or passion, excited by the expectation of harm, or the apprehension of great danger impending. Now, that is the definition of fear with any of us. The fear of some great calamity, something that is going to harm you, coming upon you. That is what we mean by fear. All animals have it. Why, if there was ever an animal that didn't have it, that had no fear, that animal would have been extinct long ago. For fear is what keeps us alive, fear is what preserves all of us; fear in the mind of the wild animal is the greatest life preserver. We all must have it to some extent, but in wild animals it is the master emotion. They live all the time under the emotion of fear, because if they did not, if fear did not keep them on their guard all the time, their enemies would come upon them and destroy their lives. They can only be preserved by fear, by constant watchfulness. Fear, then, is one of their first instincts, and their wildness comes from this fear. This instinct is very persistent and very hard to overcome, and when apparently eradicated, it may spring up when great harm is received or apprehended, and quickly become again the ruling passion. When any animal—not excepting man—is thoroughly under the influence of great fear, he cannot be taught anything; he abandons his accustomed habits, and is deaf to every voice, blind to every sight, and is possessed by only one mad desire, to run, to flee. To do this he will break all bounds, or leap into any abyss. A panic-seized animal is no more unreasonable than a panic-seized man. I have seen a herd of a thousand Texas steers stampeded, and I have seen with what unreasoning they run, and I have witnessed a thousand men, a regiment of panic-stricken soldiers fleeing, not a bit less unreasoning than the Texas steers; no more under the control of judgment or thought is a panic-stricken man, or a mass of panic-stricken people, than the wild steers that we used to have in this country fifty years ago, that were brought in from Texas. So, we are very much like the other animals if there comes a time when fear is so great that reason is dethroned. Fear is the one passion in the mind of the domestic animal which must never be aroused, if you would always have him to be perfectly safe and to give you the best results in every way. Fortunately, by domestication, this instinct has very nearly become extinct, or at most is only rudimentary in most of our farm animals. I must do all I can to bring about this condition. I must protect the horses or the cattle on my farm, or the chickens around my house, or anything there, so that there shall never be any occasion to call forth their fear. I must see that no harm ever comes to the horse, I must put it where it cannot be harmed; if an animal is weaker than the others, and they are likely to fight it, I must remove it from them; it cannot do well, cannot thrive under the emotion of fear, absolutely can do nothing for me, so I must take care of it and see that no harm comes to it in any way whatsoever. Now, there are some people who through just wantonness will scare animals, they like to frighten little things; to see them look scared; why, good little boys are taught that is nice to do it. It is *not* nice. It is not nice to scare anything. Some of my friends now sometimes try to scare me. Boo! they say. Do you know, I always want to fight. I don't let anybody try to scare me. I don't want to be scared. It don't scare me now, of course, but it makes me mad—I mean, I don't—I don't—well, I don't like it. That is all. I think it is a silly, foolish thing and ought to be crushed out. It is not the right thing to teach them at all. If I have anyone on my farm who is in the habit of scaring anything, or wants to throw his hat at a bunch of foolish chickens, I make him go. I tell him to get off the farm as rapidly as he can, but to Go! I don't want him around until he gets over that foolish habit. The animals should not be frightened at all. We are their protectors and should keep them from all harm. That is the way Mary kept the lamb, you know, that is what made the lamb love Mary so. [Laughter]. You remember the story. Well, that is a thing we should look to all the time. Domestication should finally eradicate the instinct of fear. And it can, pretty nearly. Now, do you know that almost all of the young of the animals that have been a long time under domestication, the young animals are born without the instinct of fear? Why, don't you know, the young calf, as soon as he gets on his pegs, he will just come up and nose right around. Now, if he always meets kind treatment, sees nobody but his friends around, either two-legged or four-legged, he will grow up that way, to be always fearless. That is just what we want. No one, nothing will scare him. If anybody should say "Boo!" to him, he will just look with his great big eyes and wonder what you mean, what is the matter, that is all.

They say the turkeys, in Turkey, Constantinople, if you throw anything out, they will just look at it and start to eat it, and if it should happen to hit them they will just look to see how you happened to make that mistake. They are so gentle. They are scavengers. They have been there for generations, and centuries. That sort of treatment has extinguished fear, it has gone from them.

We should have our domestic animals without fear, because, as I say, they are born without fear. We should keep them free from it by the treatment we give them. When a colt is young—I spoke about a little calf. You know a colt, just as soon as he can get on his "pegs," he just blunders around and comes right up to you. As soon as he gets his intelligent eyes wide open, he wants to put his nose in your face and see just how nice you are, and look you all over. Now, if no harm comes to him in this hour of exploration of the big world, he has a fine prospect for a docile, happy life, and if there is no change during the first day, nor the next, and if these experiences can be continued for weeks and months, what have you got? You have got a thing that is lovely! He is delightful to handle, and if his master, who now is strong enough to put the youngster wherever he wishes him to be, handles him kindly and gently, talks to him in gentle tones, even gives him some "baby talk," that young thing is fairly started to become a fearless, trustful animal, with a disposition that will add greatly to his value. But *don't* ever try to do anything with him when he is getting his dinner. Nobody likes to be disturbed at dinner. I always dislike to have the telephone bell ring when I am at dinner. Don't disturb the colt when he is eating. Let him have his dinner. That is what you make your money from. See that he gets his dinner. Don't move him while he is eating, because he may lay his little ears back, as he has a right to do. But you just wait until he has his dinner, then just take him and put his little halter on him and put him around by his mother, where you want him. If you treat him right he will want to do what you teach him to. Oh, I remember, I remember one of the most painful incidents in my life. I was living with a good man, he was a good man, I know he was a good man; he was always good to me, too, but he had a little calf, and he was trying to teach the calf to drink. He would put it in a pen, then he would take it out for some reason and try to teach it to drink. It didn't want to drink, it couldn't drink, consequently it didn't drink, didn't do anything. He worked away with that calf; he was a big, strong man, and finally, just in great anger he picked that calf up and just threw him into that lot, and the little thing just lay there a long time. He went away and I went away, and it was dark then and pretty soon I felt so bad that I got up in the night and went and milked that cow, and I gave that calf some milk, and he just drank it, just as sweet as he could, right in the night. I never had any trouble in teaching a calf to drink in my life. I make him suck my finger; Oh, yes, I always thought it was good for my fingers [laughter], and then get his nose right into the milk, and then—why, they always knew I wanted them to learn to drink, and they drank. Now, if the young thing meets with the switch of the tail of some unfriendly animal, or a kick, or is pushed over or run over, or if an unkind or unsympathetic master has treated him harshly, then for self-preservation the instinct of fear grows and becomes dominant and he is soon a wild animal, controlled largely by the instinct of fear. We do not want fear to come to any of these animals, because we have got to make money out of them. Money value is what I am talking to you about. Why, you never saw a wild animal fat, did you? Who ever saw a squirrel fat? Did you ever see one? I guess not. Or a wild turkey, or a deer. Our animals, in order to be fit for the market, must be fattened. We cannot fatten them if they have fear. They must be perfectly comfortable and without fear. The calf, the cow, nor the steer will ever fatten quite as easily as if they were free from fear. Besides that, fear makes animals dangerous. If you have a cow who gets scared when you go to milk her she is likely to jump and knock you over, and make you feel bad, kick you in the face, or makes you lose the milk, at any rate, unless you have your mouth open. It is bad to have her get frightened easily. It is bad to have a horse get frightened, because how many, many times do we read where somebody was driving with a team when the tongue came down and a runaway or something happened, and some one is seriously hurt. I have known several people in my life killed by runaway horses. "Simply because the horse wasn't well trained," you say. Well, you can get them that way. One of the most serious accidents might have happened to me if it were not for the fact that my horse would hold as still as any intelligent person could hold. I was riding one night, with some other men behind me, trying to capture a battery on the Mississippi river. It was as foggy as it was this morning. I was directed to keep on the path leading right down the Mississippi river. Every mount was fresh. We wanted to capture that battery. I was riding a horse that had been given to the Colonel of a Texas regiment by his daughter, that she had reared. He had gone to Virginia and he had come back on that horse from Virginia. The horse had swam the Mississippi river. He was leading him on the other side, taking a message to the Mississippi army of the Confederacy when—when I got him. [laughter] and I had his horse. He wanted me to take his horse. He had to be turned over and be sent up to Quincy, I think, or Alton, or somewhere; was where the officers were sent. The soldiers were sent to Camp Douglas and the officers somewhere else. We had ridden together a day. He was an old man and I was a young fellow. All old men like young fellows. That is a fact, now. I didn't know it then, but I do know it now. All old men like young men. He took a fancy to me. When we got near Natchez, he turned him over. He says, "I wish you would take this horse." He told me he was the best horse in the Confederate army. He told me how many miles he had ridden. He was just a common-looking horse, but rather fine, rather nice. Now, he said, "You take him and ride him." Well, I took him, and I had him a good while. I could lie right down by him and saddle him and feed him right there. There wasn't any more danger of his stepping on me than there was of my stepping on him. He knew where I was just as well as I knew where he was. We were going along this path, and it happened there was a gully there. We were near the Mississippi river, down in the State of Mississippi. Just a narrow gully, perhaps as wide as this row of seats between these two aisles, and that was twenty or thirty feet deep. That path came along there, and in that country they sometimes cut trees down, logs, and roll them over and make a foot-log, as they call it. The path went right along that foot-log. I could see a little gray color there, just the same color as the path. When I came to it, I remembered afterwards there was a little hesitation in "Jef." I called the horse "Jef." You don't know the reason why, but it was a good one. [Laughter]. He just hesitated. I don't know just what happened. It was a cavalry horse. His rider don't have to guide him. You "think" what he wants to do, and he does it. A horse that is left to be a saddle horse, and a man fit to ride a saddle horse, they are one animal. I don't know how I made the horse go, I just "thought" I wanted him to go I reckon, and he went. Well, the brush pretty soon went up past my face, and he was on my leg and I knew that I had a broken leg. I knew something was the matter. I reached my left hand toward him and I said, "Whoa, Jef, Whoa." He was stuck down below in the soft mud. I always carried matches in my pocket. I have got some now, though I don't smoke. With my right hand I scratched a match to see where we were. The boys up there had stopped, they hadn't followed on, fortunately. Now, of course, there are men who know how to do things quickly. All the boys came down there, No. 1, 2 and 3 dismounted, No. 4 held the horses. Down they came. I told them to bring the horses and come down. All the time I was talking to the horse, saying "Whoa, Jef, Whoa." His feet were not on the ground. He was just lying in the ditch, in the soft clay. Do you see what I was afraid of? I was afraid he would struggle, and I was under him with my saddle there, and the horse could grind that leg all to pieces, pushing the bones through the flesh. I have seen that thing done, and I did not want it to happen. I just said, "Whoa, Jef, Whoa," and some one came down and said, "Why, the horse is dead." I said, "He is not dead. He is all right." I kept talking to him and some one said, "Why, you need not talk to him, he is dead;" another said, "Why, he winks and looks at me."

"Of course," I said, "He is all right." Now, they put a strap around me and four fellows got hold of the straps of the horse, in the various places; in fact, they put some straps around his head, and some took hold of his tail. "Now, then," I said, "I am going to say, one, two, three, lift." Now, ten or a dozen had hold of that horse, all of them stout men. I said, "You must put him on his feet, then lift. Ten of you can do it. A horse don't weigh over 1200 pounds. Any man can lift 120 pounds." They said, "Sure they could." Four fellows had hold of the straps around my waist. I said, "You fellows, as soon as the horse starts to get up, take me out quick. If he falls back, I don't want to be under him. One, two, three, lift!" The horse was on his feet and I was taken out. In a few minutes they got a number of halter straps and tied up my leg, and I don't limp a bit. Now, do you see what might have happened? That horse could have just torn around there until he crushed me all to pieces. My feet were still in the stirrups when we went down. He could have ground up one of my legs so I would be a cripple all my life, and would have to wear an artificial limb. There isn't an artificial thing about me now, not at all. So I say, a kind horse is worth for his disposition for family use three times as much as he would be if he was scary, nervous or vicious. In fact, no one should risk his life with a horse of that kind, because lives are too precious and limbs are too valuable.

Now, I say, fear not only makes an animal dangerous, but makes it absolutely unteachable. The same way with a man or a boy. Nothing can be done under the instinct of fear. Why, you know the "Good Book" contains so many, many places where the greatest Teacher of men that ever has come into the world said, "Fear Not!" "Fear Not!"

KINDNESS.

The way to overcome fear in our domestic animals is by kindness. Kindness from the day of their birth, and continued as long as they live. This gives to all of them that kindly disposition which makes them accommodating, quiet, teachable and safe. It makes them loving and loyal. It adds to their length of life. A horse of a fretful disposition is old at ten years, while one that has a quiet disposition may still be young at twenty. It is strange that men do not learn this. How often does a young man, just starting out in life, with a wife, buy a good team of young horses, maybe go in debt for them and sign a note, in order to make the horses appear to have much spirit and life, checks them up high, cracks his whip over them, and sometimes strikes them or kicks them, drives them fast with a heavy wagon or a load. In a very few years they are a span of plugs, or perhaps one is dead. He is hardly able to pay for the other, has to quit the farm and lose all he has. Another man, with kindly treatment, may keep a similar team for twenty years, doing incredible amounts of work, and hard work, and yet he never frets them and never has required of them anything they were not able and willing to do. They have made him rich, and he has made their lives happy.

In Paris, it is said, horses are treated more cruelly than anywhere else in the world, and because of this treatment, though they have the best street draft horses in the world—the Percheron—they live on the average but three years.

In the cavalry service there were men who, because of their nervous, vicious and unkind feeling toward their horse—always in some sort of a quarrel with him—used up each horse given them in six months or less, while there were other men, often the heavier, who, because of their kindly feeling toward their horses, rode the same horse throughout their three or four years of service, and at the end turned over to the government a sound, serviceable cavalry horse. I was in the cavalry service five years during the Civil war. We started from DeKalb county, here. I recollect one man, a man five inches taller than I, built just like me—he is my brother—he started from there with a four-year old horse which he sold later to the government for $125. He rode him through this town, camped over here where Col. Ingersoll's regiment was. From their camp we went on to Springfield, on to Cairo, down to Fort Donnelson and Shiloh; we went on down to Vicksburg, and we went in every county in west Kentucky, every one in west Tennessee, all but two in the State of Mississippi, and we ended up on the Rio Grande, to watch the French and Austrians before Mexico. The regiment was mustered out in '66. And that horse carried that man all the time. They were Charley and Jim. My brother's name was Jim, the horse's name was Charley. Always the two were together. He was not much of a horse, just a plain horse, that was all, but he had had great care. He was never worried. If the enemy was going that way and Jim thought he was not likely to catch him, sometimes he might touch the horse up with the spurs, or, if we were going that way and those fellows looked as though they were trying to catch somebody he just touched him up with the spurs [laughter]. All the other times the horse never knew Jim wore spurs. He always managed to "get there" when the other boys did; when we wanted to get away he wasn't the last one either, that horse. [Laughter]. You understand.

KINDNESS TO CATTLE.

Upon cattle, kindness has a value quite as great as upon horses. Those who have charge of experiment farms, where cattle are fattened, often observe that at one weekly weighing there is found a lighter weight than at the previous week's weighing. Sometimes this shrinkage is found to be quite startling. Inquiry often reveals the fact that a foolish herdsman has taken offense at some steer and has gone into the feed lot with a whip or a club and has beaten and chased him about till all were terrified, and the result is found in loss of weight, worth possibly more than all the feed given during the week, and possibly the bunch will not begin to show an increase of weight for yet another week.

You probably know or knew of Mr. L. H. Kerrick, the man who fattened so many cattle for the stockyards exhibition recently in Chicago, when asked how he acquired such wonderful success with his cattle he said three things were necessary: Food, care and kindness. Kindness, he thought, was equal to the other two. Just think of them standing there in the stockyards, placid and happy because they always had been happy, never nervous, nobody ever had disturbed them.

Now, I suppose there is no place among the animals we use where kindness counts so much as with the dairy cow. The dairy cow is even more responsive to kindness and quicker shows the effects of kindness or unkindness than any other farm animal. Two cows that had usually given equal quantities of milk, and of equal richness, were taken for experiment; one treated and milked as usual, milked by a man who knew how to milk, gave the usual quantity of milk and of the usual quality. I say they should be milked by a man, because women are not strong enough to milk. I never saw a woman who was a good milker. Now, that is a fact. You ought not to have your women milking. You have sometimes heard that women ought to milk. Well, she can't. Her hands and arms are not strong enough. To resume the illustration: The other cow was brought in from the pasture on the run, was scolded and harshly treated by the milker; her milk was very much reduced both in quantity and richness. Sometimes, under very harsh treatment—in fact, nearly always, the cow "holds up" her milk, as we say. Now, really there is no such thing. This form of speech comes from a lack of knowledge of how milk is secreted, and when. When milking begins, there is but little milk in the cow's udder. The material which is to form the milk is there, but the cells of the mammary glands have not yet *secreted* the milk. This secreting, or elaborating of the milk proceeds as the milking goes on. It is not under the control of the cow's will, scarcely any; not any more than your thinking is under the control of your will. If she can control her thinking then it might be under the control of her will, but she can't; most men haven't learned how to do that. Now, to illustrate that proposition: I have read it somewhere—I don't remember where—that an experiment was tried of two cows giving an equal amount of milk. One was milked, giving as much as she ordinarily did, and the other one was killed and her udder cut off and put in a tub of warm water—say 100 pounds. Then it was dissected and manipulated until all the milk was gotten out of it. Now, if this other cow had given twenty pounds of milk, as this one had been used to giving, this tub of water now would weigh 120 pounds, but it did not. It did not weigh more than 103 or 104 pounds. The milk wasn't there, yet. The milk only is secreted during the process of milking, during the process of drawing the milk, and, as I say, this secretion of milk depends entirely upon the feelings of the cow—of her state of mind. If she feels angry, or grieved, or unhappy, little or no milk will be secreted, but if she feels comfortable, happy and loving, it may be secreted in full quantity, and of richest quality. The milk is secreted by the mammary gland. This gland acts under the influence of the emotions, as do the other glands.

To illustrate this: Suppose I should continue this talk until away toward midnight—which I shan't—till you all are both tired and hungry, and then suppose I should begin talking in a pleasant way about a coming banquet which is preparing for us at the hotel, speaking of the nice things of the first course upon the menu, then of the oyster patties, the Saratoga chips, the savory roast turkey, the cranberry sauce, the sweet potato croquettes, the ice cream, cakes, and the delicious coffee, and before I am half through I observe you are swallowing. Your feelings have set your salivary glands working, and without your willing it, your mouths fill with saliva, preparatory to receiving the food. But, suppose instead of talking of this pleasant banquet, I speak of something that greatly distresses you, then your mouths become dry, and your tongues parched; no saliva is secreted now. Or, suppose I go still further in my experiments upon you, and say to you some very outrageous thing (I can do it), something that makes you very angry; your mouths are still dryer, you cannot spit now, or if you can, you will spit fire. Or, suppose I were to describe the recent assassination of the King and Crown Prince of Portugal and the distressing sorrow of the Queen, before whose eyes these foul murders were committed—if I were eloquent enough to make your pity and sorrow get full possession of your feelings; then I would probably see tears in your eyes. That is, your feelings of pity would cause your lachrymal glands to secrete tears. As the salivary glands and the tear glands of man perform their peculiar functions only under stress of the feelings, so with the cow, the mammary gland acts only under stress of the appropriate emotions. The mammary gland is the gland of motherhood, and acts best under the emotions of affection, love and kindness, and that treatment which will arouse these emotions is surely of the greatest money value.

One other point must not be forgotten. The mammary gland is affected in still another way by the emotions of the milk-giving animal, and thus the character of the milk is affected. Milk taken from an enraged mother sometimes has in it an element which makes it seriously harmful, even poisonous to the young. Mother-pigs have been greatly harrowed and angered by dogs, and while in this state of mind, their pigs have drawn the milk, with the result that some of the pigs were sick, and some died as if they had been poisoned. Colts sometimes have serious cases of diarrhea as a result of drawing their mother's milk just after she has been misused seriously, or greatly terrified by a fiendish driver. People who give to young and delicate children the milk of a cow, should see that the cow is always kindly treated. Milk generally is the fluid of life, but it may be made almost a fluid of death.

My purpose tonight is to teach everybody to love farm animals, and then, of course, they will be kind to them. Think of the horse, how docile, how teachable he is. What a variety of things we can teach him to do. Every man who has had horses can tell remarkable and truthful stories of what some wise horses he has owned could do. Think how valuable the horse is in our civilization. In producing food for humanity, 95 per cent of the work is done before the grain reach the market. And of the power, upon Illinois farms, that does this work, 99 per cent is horse-power. Take from us the horse, and you would make our farm work ten times harder, you would destroy a great part of the commerce of the world. Think how dependent he is upon us for all his food and drink and comfort. He is absolutely at our mercy, and if we are merciless, how pitiful is his condition. Think how tireless he is; up and down the furrows he goes, never questioning why; from early morn till the end of day, and—distressing thought—often with flesh worn bare by an ill-fitting harness or careless treatment. Think how he is tied up by the head at night with no chance to turn around and scarcely any chance to move. No galley slave, in the times when men's hearts were stone, ever had a harder fate. Then that cruel check-rein; how merciless it holds his head in a most unnatural position—a position which under ordinary state of mind he would never assume, unless compelled to do so by that abominable double bit attached to the over-draw rein; his delicate and sensitive lips forever pulled upon by narrow straps, which all the time press down upon the most tender part of his head with torture that is enough to craze him.

In addition to this, there are the cruel, senseless and useless blinders, which compel him to look with both eyes straight before, or with crossed lines of vision, for which his eyes are no more constructed than are man's eyes for looking all the time at an object two inches in front of his eyes. Let any man try this for five minutes, and he will appreciate its cruelty. The horse's eyes are made so that he easily sees all about him, much of the time using his eyes separately. He gets great pleasure from looking about, and by this becomes more intelligent; and such intelligence adds greatly to his usefulness and value. He likes to see his driver, and enjoys looking at him, and in a general way he can know what his driver is doing, without turning his head. Why deprive him of this pleasure? His knowing what is going on about him generally keeps him from getting frightened, and makes him a much safer animal. Unusual noises do not alarm him so quickly if he can see what makes the noise, and if he can see his master is near, he feels much safer, provided he has an intelligent master.

No other animal is braver than the horse. Think of the "Charge of the Light Brigade":

> "Cannon to right of them,
> Cannon to left of them,
> Cannon in front of them
>   Volleyed and thundered!
> Stormed at with shot and shell,
> Into the jaws of death,
> Into the mouth of hell,
>   Rode the Six Hundred."

In a cavalry charge against cavalry, I saw two men ride directly toward each other at furious speed, each man with a revolver in his hand. So true the horses went that they met each other squarely, "head on," and when the charge was over, two dead horses lying there attested the bravery of the horses quite as much as that of the riders. Shall we not then say that a brave and noble horse is worthy of his brave and noble rider?

Once there came a great hole or chasm in the Forum at Rome. They sent over and consulted the Delphic Oracle. She said, "It will never close until the most valuable thing in Rome is thrown into it." Ladies got their jewelry and threw it in, fine tapestries that had been gathered through the centuries were thrown in, still it stayed open; they searched out and took all the beautiful statuary that had been stolen in Greece and threw that in, yet the chasm stayed open. A young man thought he knew what was the best thing in Rome, and the most valuable. He thought the best and most valuable thing in Rome was a man. He got on his horse and rode him right into the chasm, and it closed. May be the horse was the most valuable, may be it was the man. My judgment is that the man and the horse made one—the most valuable thing that there was in Rome. [Applause.]

Except the dog, no other animal is so companionable and so loyal as the horse, and if the horse could live with us as freely, and with his liberty, and in such close relationship as the dog, it is probable he would be as companionable.

Most everybody who has had even a little to do with a horse, thinks he knows all about horses, but of all the men who know the least about the horses, I put first the fake "horse trainer," who comes along and makes a show of his ignorance, for an admission fee. He ought always to be arrested and fined for cruelty to animals, and his applauding audience ought to be told what dupes they have been. And next after him comes the Western cow-puncher, the broncho-buster, who only overcomes the brutal fear of his victim, by his greater brutality and dogged persistency.

ANIMALS MUST BE RAISED TO RETAIN SOIL FERTILITY.

To keep up the fertility of our farms, to keep the soil over which we Aryans had control four thousand years, from going back to pre-historic forms, we must engage in animal husbandry, or, as Mr. Wallace of the "Wallace's Farmer," says: "We must all go to grass." This is not a cruel sentence pronounced upon us, but a delightful promise of future joy. For the great charm of farm life is the animals upon it; the poultry, besides their profit to us, enliven the lawns and pastures both with their pleasant voices, their pretty plumage, and their bustling, busy habits; the pigs, big and little, as they grunt satisfaction at our appearance, or as they follow us across the pasture with their jolly serenade, nearly repay us the deficiency which there sometimes is between the value of their food, and what they bring us when sold; the young lambs at play out in the pasture—they are a "circus" indeed; and the colts, how they love us, how they do like to kiss us with their soft delicate lips, and then run off with our hats. They are jokers. All these young things, because they are so winning and yet so helpless, appeal to our sympathy so that we are better men for having the care of them. The kind farmer will see that they never suffer from hunger. He will see that they are fed often. He will not let the young calf go all day without food. He will not let the young colts follow their mothers to the field, to tramp all the weary day, but instead he will leave them at the barn, and the adjacent lot, where they can play in the sun, nibble grass when they like, and be fed warmed and sweetned cow's milk at the mid-forenoon, and afternoon. Their mothers in a day or two will not worry for them, nor will they worry for their mothers. Now, the older horses, in the fields working all day, ought to be watered once in the middle of the forenoon, and once in the middle of the afternoon. They need it. Every time they go around a furrow they are using up part of their vitality. They require a drink just as much as the hired man does. I always water my team at work in the field, and they always keep well. Hence their money value is increased, and they are made comfortable. Why, the sense of thirst is one of the most painful we ever suffer from. Now for all the young things on the farm, the careful farmer will provide convenient, clean, dark stalls into which all his young pigs, calves, and colts can go to escape the distressing annoyance of flies. With their thin hair, delicate and sensitive skin, short tails and inability to keep flies off, no kinder service can be done for them than to have some place where they can escape the torture of these pests of the farm, nor can any other thing add more to the farmer's profit. During "fly time," the young things make but little growth, whereas they ought to add 50 to 100 per cent to their weight. Of course they should not be shut up in dark stalls, but should simply have them as places of refuge in time of need, and at their own sweet wills.

REVERSE ACTION OF KINDNESS.

Thus far I have considered the effect of kindness upon farm animals, as it affects them, and as it affects the farmer's pocket book, but I must not conclude until I have considered the reverse effect of his acts of kindness upon the farmer himself. Being kind to others makes a kind man. Whatever one does to another he does also to himself. Whatever he gives, that he receives. By thinking kindly, one is made kindly, for "As a man thinketh, so is he." A man possessed by unkind feelings toward any living thing cannot be truly happy, and when these unkind feelings are manifested by unkind deeds he becomes, so far, a wicked man, and shortens his life, for "The wicked shall not live out half their days." So by kindness to his animals, a farmer not only makes more money, but makes more happiness for himself. He will live longer; he will be better to his wife and to his children. Life will be sweeter to him, as he approaches that perfect character described by Isaiah, "He shall feed his flock like a shepherd; he shall gather the lambs with his arms, and carry them in his bosom, and shall gently lead those that are with young."

I thank you. [Applause.]

Chairman—The next address is "Woman in the Home, and in the Community," by Mrs. Margaret Mather Romine. [Applause.]

ADDRESS.

Mr. Chairman, Ladies and Gentlemen—I am sure that warms my heart up very much because I feel almost as though I were coming back home when I come back to Illinois. You know this is where I begun my work. While I have gone over into her sister state to live, I want to tell you I left part of my heart in Illinois. So I am glad to get back again.

In talking to you about the Woman in the Home, and in the Community, I shall expect you to carry the message, if I have any for you, home to your wives. I am sorry your wives are not all here, because I take it that the majority of this intelligent looking body of men have wives,—at least I hope you have. [Applause.]

I wonder if you would be interested in knowing how I came to talk on "The Woman in the Home and in the Community?" Two years ago, when I was working in Illinois in your Chautauqua work, a woman came to me one day at the close of the session and she said, "I am just envious of you, of your work." That surprised me very much, and I said, "Why are you envious, what have I. for you to envy?" and she said, "I think you must have such a *good time*. Your work seems to me so pleasant." "Of course you know, you see only one side of the Public Worker's life," I said. "What is your work?" She said, "I haven't any." And I wish you could have seen the discontented look in her face. I said, "No work, no earnings, nothing at all?" "Oh," she said, "I keep house." And do you know, that just went home to my heart, that a woman should come up to see me and say she had no work, when she was a housekeeper and a home-maker. I said, "Have you a family?" She said, "Yes, I have two children and my husband." "And yet you come to me and say that you envy me my work, and that you have nothing to do? How can you say that?" "Well," she said, "It is so narrow that sometimes I think the four walls of my house will close in and crush me." *Narrow!* In a home! The center of the Home Life! And right then I wondered if somehow I had been guilty of giving the wrong impression, or the wrong ideals of the relation of the woman in the home to the life of the community. And so, out of that incident came my talk of "woman in the home and the community."

Do you know, I believe that for the last few years we have been so interested in education for women, in club life and in careers, and all of that sort of thing, that we have grown away from the idea that the home is an important place. We fail to appreciate the real greatness of the influence, the greatness of the power of the woman in the home. And I am sorry to say that she is of that opinion herself. Not all of them, there are exceptions to that of course; the great majority are exceptions to that idea, and yet, there is a general feeling of that kind, don't you know? Now, for instance, a woman who is educated along any particular line, who is preparing to follow any definite line of work, when she is married her friends say, "Well, her work will stop now, she is married." Just as though that were the end of you! There is nothing more for you to do. You are married, you might just as well be dead! [Laughter.]

Why, friends, then is when woman's work has just begun. Woman's influence has only started, because the home, my dear friends, is the center of all progress; the center of all greatness; all true greatness, for the human family starts in the home, in the home life and Woman's influence in public life of any kind cannot begin to measure up against the influence of the woman in the home.

I began to think over the women whom I had known that I had considered a power, after this interview with this discontented woman, and I remembered one whom I met when I was perhaps a girl of fourteen, out on the plains of Kansas, a woman who went there from the east, a woman who in her growing-up had been accustomed to the refinements that were not afforded in the then comparatively new state, and she went out there with the corn and the harrow, to help her husband build a home in the new country. You will pardon me if I dwell upon that, I hope, because you know you always love your own state, and the more I realize the development of the state of Kansas, the more do I appreciate the fact that they have been martyrs, and when you speak of "Bleeding Kansas" you speak of bleeding hearts, and the road of its progress has been marked by the blood of the footsteps of the people of the past, who trod the rough ways of which you have no appreciation. This woman was one of those heroines, and her husband was a hero! I knew her in her home life. It was my rare privilege when I was a woman grown, to spend a year with her. I was a school teacher and I boarded there. And now, as I look back over her life, as I look at the career of her children and see what her boys are doing and know what her girls are accomplishing, I realize that her influence has only just started. Just a year ago I spent a week with her. She lives in Springfield now and her sons live in Springfield. If I should mention the name of one you would recognize him. He is an honorable citizen of Illinois, of whom Springfield may be proud. And I want to tell you that he is a man of clean character and sterling worth. You will hear from him some of these days. He belongs to the class of men who have no price. Do you know, I don't have any patience with that saying, "Every man has his price," because I know that there are men in the world who could not be bought by all the gold in the United States, because they have such high standards, such ideals of manhood that have been established by some woman, that you can not hope to approach them. And this is one of those men. And this woman's influence has been such that he has been made that kind of a man. They lived in a little, simple home, without any of the things that you consider absolutely necessary. There were five of those boys, and this one I have mentioned in Springfield is just like his brothers. They are all of them honorable, upright men in homes of their own, and there are five homes to that woman's credit. And then, those two daughters of hers; there are two more homes, seven homes to that unassuming woman's credit, homes of the highest possible standard. And I said to her when I visited her a year or two ago, "Do you know, that I think you have had the most wonderful influence of any woman I have ever known?" Just because I happened to know her intimately. I might have known hundreds of such women throughout the State of Illinois or Indiana—and the tears came into her eyes. "Why, it seems to me," she says, that I have been an absolute failure. I never felt that I had any influence at all." I said, "Have you forgotten—have you forgotten the kind of men your boys have made? Don't you know?" "Why yes," she said, "Of course my boys are good men." I said, "Don't you know they are that because they could not live with you a long time and be anything else?" Do you think that any woman who has ever worked exclusively in public, on the platform, could possibly be instrumental in establishing seven homes of high standard, influencing the daily life of the inmates of those homes?

I might go on and tell you of other women in similar positions. Understand, my friends, that it does not necessarily mean a home of luxury, a home of plenty; it means that it has to do with the *spirit* of the woman who presides there.

I have wondered much how it is that the woman in the home has come to consider it a small thing. How it is that we somehow belittle the life in the home, and I have divided the women, the home-makers, into three classes. Perhaps I would better say four classes, but when I think of the three classes, I am thinking of those who are an injury; I am not counting the great fourth class of successful home makers whom I have not thought it worth while to mention, because you will be thinking of that class yourself. But here are the three classes I speak of: The woman who *neglects* her home. The woman who *belittles* her home. The woman who *degrades* her home. Of course first, there is the woman who *dignifies* her home.

THE WOMAN WHO NEGLECTS HER HOME.

Now, the woman who neglects her home receives a great deal of comment from the public. We see her often mentioned in the newspapers, in the joke columns, etc.—I often see no point to the jokes—We speak of her as the woman who spends a man's money, has a pet dog, plays bridge, whose life is spent in the pursuit of amusement. Do you know there is something the matter with the woman who has to be forever amused. When we have reached womanhood's estate we should have put away that object of amusement. We believe that when we have to be always amused, we have not developed our own resources.

THE WOMAN WHO BELITTLES HER HOME.

But the woman who spends all her life in the pursuit of amusement—and we hear a great deal said about her—friends, I don't know whether she is a more undesirable citizen than the woman who belittles her home, or the woman who degrades her home.

I would classify as among the women who belittle their homes, the class of which I first made mention; the woman who considers her home a narrow place, a place that is too small for her, she feels that her sphere is a large one, and her home is too small for her to fill. As a matter of fact, she is too small for the very smallest home that could posibly exist; she has not enough spirit to fill any sort of a home, that woman who belittles her home.

THE WOMAN WHO DEGRADES HER HOME.

Then there is the woman who I think is more common than any other of the three, the woman who degrades her home. Now, I don't mean in the sense of disgrace. The woman who degrades her home as I mean it is the woman who sees nothing in her home life but drudgery. The woman who makes a slave of herself. I was quite impressed with what the previous speaker said about doing the milking. Do you know, I think the woman who does the milking and carries in the wood and water, carries out the slop, builds the fire—I think that woman is degrading her home, because she has not a proper appreciation of the dignity of her condition, and she never gets any thanks for it. She never gets any appreciation for it from her family, because the woman who makes her life one of servitude, mark you—servitude! The woman who makes her life one of servitude is simply looked upon by her family as a servant. Now, she may do that from the best motives possible. She may do it because she loves her family so devotedly she wants to save that husband of hers all the work she possibly can save him, to protect her boys, to save time for them to get their lessons, but eventually they come to look upon her as a drudge, a mere servant, somebody to wait upon them. Why,you can never respect a woman who puts herself in that position. Not a bit of it. The woman whom you respect, the woman whom you look up to, is the woman on whom you wait and the woman whom you serve, is not that true? And the woman who occupies the dignified position of the queen of the household, should remember that is her position and not put herself into the position of a mere slave and menial. Now, when I speak of the queen of the household, it is often necessary for me to follow it up with a little explanation, because you know,, the men are so jealous of their authority and their place as head of the household, that I always have to explain that the true kingdom, the true kingdom of the highest type has also a king, a king and a queen, and when you entered into that business of home making with that wife of yours, she enthroned you in her heart as a king! If you have lost that high position, then that is your own fault. If you are no longer king, it is because you were not worthy of your royal estate. It is because you yourself have belittled that place, you have come down from your high estate. Possibly you came down as a tyrant. Have you treated that wife of yours as the queen of your household, or have you treated her as a mere underling? Has she had a part in the business affairs of your house? Have you taken better care of that horse of yours, better care of the farm animals than you have of your wife? Why, you say, "That is unreasonable." My friends, it is something that is done every day, right in the State of Illinois, that the farm animals have more protection, more care, more consideration shown them than your wife the queen of the household. And you are supposed to be the king, yet you are nothing but a tyrant.

There is one point which is rather a touchy one, that is, concerning the business relations of the husband and wife. I mean, the pocketbook. Now, you men are perfectly willing to entrust your wives with your honor, with your love, with your name, but when it comes to your pocketbook! Oh! That is a different matter! Now, I never yet said that to an audience but what if they had a chance to talk back, some of the men would say, "Why, the pocketbook is hers. Why, she has just as much right to it as I have. Why, everything I have belongs to her." That is all right, but you *carry* the pocketbook. If she wants her share of what is hers she has got to ask you for it. Suppose you let her carry the pocketbook a while, and you ask her for money. If it is your pocketbook in common, she ought to have her turn in connection with carrying it, and you go to her for everything you want.

Delegate—She hasn't got a pocket.

Mrs. Romine—The woman will take care of the pocket all right. Listen. You have got too many pockets You men. [Laughter.]

Now friends, seriously—We always do have a little joke about this. We always laugh, but seriously, friends, that is the rock upon which many a kingdom of home has gone down. That is a thing worthy of your consideration. You should not day after day put you wife in the position of a beggar—because that is what you do when you deny her what is rightfully hers, when you humiliate her every day of your life to the point of asking you for what is rightfully hers. Is she not an equal partner with you in this business of home making? Why should she be accountable to you? I tell you that is the source of more unhappiness among women than any other way men have of mistreating women. I know, because I tell you that women come to me and unburden their hearts because I am a stranger and am gone the next day and will forget it, and the over-burdened heart must find expression somewhere, so they come to the stranger rather than to the intimate friend who would know you and remember that you mistreated your wife. For she cannot keep it to herself any longer. I will leave it to this body of women, who, out of their desire to protect you, may not admit it—even though you have lost your place as king in your homes she will not admit it, her loyalty is such to you that she keeps you hidden from the public, but there are women right in this audience who could tell you they have some humilating experience all their lives. The wife, the queen of your household if she is worthy of that place, she certainly is worthy of an equal share in your business affairs. She is worthy of the right of such a place. She is worthy of understanding something of your business affairs. A man makes a serious mistake in keeping away from his wife a knowledge of his business. And more men have broken up in business because of that, than any other thing. You say, "Well, men break up in business because their wives are extravagant. Yes, friends, they are extravagant because you don't let them know anything about your affairs. I heard a prominent business man in the institute work, say, "My wife knows absolutely all about my income, and she is more saving than I am, and she will guard the money just as closely as I do, and even closer than I do," because she knows. If she did not know, she would have no incentive to guard it.

Don't be afraid. Your wife will take just as good care of your pocketbook as she has taken of your love, and of your good name, and she is worthy of that place, because she is the queen of your household. She has an equal share in that position.

Now of course I think that the woman is largely to blame for such a position as that. If she takes the place of an inferior, the place of a menial, you will let her. I don't know why; that is human nature. Of course it is a man's disposition to boss. You know you all think that you are the boss. [Laughter.] I am just reminded here of a little fellow who asked his father who was boss when people were married. His father said, "My boy, I will give you two hundred chickens and two horses, and you may go out over the world, and wherever you find a woman who is boss you may leave one of these chickens, and whenever you find a man that is boss, you may leave one of these horses." Now, the boy went out on his travels. He went until he had given away 199 chickens, and he had both horses left, and he came to a house and he went in and said, "Who is boss here, at this house?" There was a big, blustering, important man there, asserting himself. He said, "Why, I am boss." Of course you could just see that, to look at him. His wife was a little, inoffensive, unassuming woman, she said, "Yes, he is boss." The boy said, "All right come out here. I have got a horse for you." So out he comes, to get his horse. There was a gray and a bay one. The boy asked which he would take, the man said, "Why, I will take the gray horse." His wife came out with him, and she pulled his sleeve, they turned aside, and she talked with him a few minutes, the man turned back, and he said, "I will take the bay horse." The boy said, "No, you won't. You will take that other chicken." [Applause.] You see that woman's influence was so imperceptible, that woman's power was so subtle, that the man did not recognize it, did not know it was there.

Delegate—He found it out.

Mrs. Romine—Yes. Now, about the business relations of the woman to her husband. I have spoken of it, I have covered it, but I hope you will think of it, and if you are one of those guilty ones, just remember that you are not living up to your high position, you are not sustaining your share of the Kingdom, if you are mean, niggardly or small, with your wife in your business life.

And the woman who degrades her home! The woman who degrades her home, friends, I believe is more guilty than the one who neglects or belittles her home. The woman who is occupied with her daily affairs, who makes the business of home making such a tread-mill of toil, such an unbeautiful thing in the drudgery she puts into it, that some one looking on, said, "Well, no home life for me, thank you! Not I! I will keep my freedom. I don't want to be tied down to any such life as that." That woman has degraded her high position.

Now, we may do that in various ways. For instance, we may become so tied to a system that we simply can't let go, 'tho the Heavens fall. Why, I have seen women who seemed to think if the washing was not done on Monday, the world would not turn around that night, the sun would not come up the next day. [Laughter.] Women who were so tied to their system, that no man in the family, no daughter, no baby in the house, in fact no one had any pleasure at all. You came into the house because you had to, and got out just as quick as you could, because that woman degraded the work of her home and made it harder. She was so occupied with the physical needs of her family, that she neglected her children, neglected her mental growth. I have in mind, an illustration, an occurrence up in Northern Illinois. The Chautauqua was in session. There was a specialist to lecture one night. I came home at the close of the afternoon session to the house where I was boarding, and told the woman about it, and suggested that she attend the evening session. She said, "Why, yes, I will be glad to go." So we got ready and supper was late, members of the family came in late to supper, when we got up from the table it was time to go. I said to her, "Are you going to leave the dishes?" Why, she stared at me in absolute amazement. "Leave the dishes?" she said, "Why no." I said, "Very well, may I help you wash them?" "Oh no," she said, "I will wash them." I suppose she thought because I was a domestic science teacher, I could not wash dishes. But her sister came in presently, and she helped her sister, and wiped the dishes for her. I stood and waited for her. I had heard that same lecture six times, so when we got there I would know what had gone before, but she had never heard the lecture. I had considered it good enough to go the seventh time, because it was such an inspiration, such a help to me. But I waited for her. She washed the dishes, she washed the stove, and swept the kitchen, and she wiped the dust off from the oil cloth under the stove. That is, she said she did. I didn't see any dust there. And then we went to the lecture. Somebody asked me once, if we got there before the lecture was over. It was about two-thirds over. But her dishes were washed, her floor was clean, her stove was clean, and her oil cloth was dusted. You see that woman degraded her home life. She degrader her position as a home maker and a housekeeper, because she could not let loose of those things in her home life long enough to go to the place where she would receive inspiration toward something better and more beautiful, where her soul was going to have a chance to grow.

You say, "Well, that is all very beautiful in theory, but my house has to be looked after." Friends, don't make the body of so much importance. Don't look upon life as just simply providing for the physical wants of the body. Remember that you are just as much importance as that house. A woman should not neglect herself for her house. You haven't any business to do that, because you are supposed to be an inspiration to that family of yours. You are supposed to have enough life about you to be able to lead them all on to better things, to provide some pleasure for them when they come there, when a woman gets so cross and tired out with her work, when the family comes home, it is no pleasure to them. I have known women who said they got so tired and worn out with their housework, they wanted to lick the children. I have seen women get so tired out with the house work they would kick the cat. [Laughter.] Then I have seen men get so tired out from work, I have seen men make such a drudgery of their work, they were so tied down to the physical affairs of life, to the material affairs of life, they have slammed the doors, and if they swore, why, I didn't know that they did, but they acted like they wanted to swear, and any way that is just as bad.

Friends, that is not home making. That is not an appreciation of life in its highest sense. We do not want to let these ideals, these beautiful ideals of home get away from us in this mad rush for money. You say it is necessary. Oh, it is not absolutely necessary. It is necessary to have some money, to be sure, but it is not, it should not be the main object in life. If it is, then we haven't a kingdom at all. Not at all. That kingdom of home doesn't mean anything to us. This woman who is so occupied that she degrades her life, would not do her love but little credit. All the clothes in her ironing have to be ironed, every little six inches, every little rag you know, must be ironed, every sheet, every pillowcase, every towel—you see I am making a confession. You may infer what you please. (Laughter.) Life is too short for me to iron that kind of things. Oh, no, I tell you. "Well, why not?" Why, for the reason I have to read the last new magazine. It is necessary. I cannot get along unless I know something of what is going on in the world. What you are doing over here in Illinois. I can't iron every little scrap in my washing, to do that, something has to go, so why not let it be the ironing? You say, "Now I suspect you are a mighty poor housekeeper. I just expected that. I just supposed that you were theoretical." Well, you may think that if you want to. Come over some time. I won't apologize to you if you find any dust in my house. I will not make an apology, because I will not take it for granted you came over to criticise my house. I will think you came over to see me. I will want you to remember *me*. I don't want you to be so impressed with what I have given you to eat, or with the looks of my house that you will go away and forget my personality. Why, do you know, I have been entertained at houses, at homes, where I never saw the hostess from the time I went in until I came to dinner. She flitted in and out, and waited at the table, then was gone, and I didn't see her any more. The only impression I had was an over-loaded table, where we all ate until we were just surfeited, and tired out. Afterwards I just thought of it as a stuffing process. Was there any individuality, any queenship about that woman's attitude toward her home?

Now, do you know, the farmers' wives are guilty of one great crime. That is, at the threshing season. Why, they prepare for threshers as though they thought those men's stomachs were made of Indian rubber. [Laughter.] You tell a woman she is foolish for doing it, she will say, "Well, I know it." Now I have told just dozens of women that. They nearly always say to me, "What would you do, if you had to cook for threshers?" Well, I would cook for threshers, that is all. But I would not cook for them as though I thought they never expected to have anything to eat after that one dinner, because I would want them to do some *work* after dinner. I would not want them to eat until they were not able to accomplish anything. That is a matter of habit, friends. You talk to a woman, she will say, "I know that is foolish, I know that just as well as you do, but if I don't, why, they will go away and say they didn't have anything to eat at my house. They will go away and say they didn't have as much to eat at my house as they did over at my neighbors." Let them say it! Who cares! Haven't you enough independence in that place where you are reigning, that place where you are supposed to live out your life, haven't you enough independence and spirit to live in the way which you know is best for you, regardless of what your neighbors, or the threshers, or anybody are going to say? Why, I don't care at all! Just say what you please! I will live absolutely independent of all traditions of that kind. I will live my life the way I know it ought to be lived, because my life in the home is important, and if I fail to realize that I am an important factor, for good or evil, in this kingdom of home, then I am a failure. It doesn't matter whether I have absorbed my time in pleasure, or whether I have absorbed my time in bemoaning the smallness of my position, or whether I have taken up every minute, every ounce of my strength in drudgery, or doing things that haven't any reason for being done. Do you know, it is a good thing sometimes to leave your work? Now, I believe in system, just as much as you do. I don't want you to think, friends, I am advocating a slip-shod, careless way of keeping house. I am not. I think there are certain duties that *have* to be performed, every day. They have got to be done every single day in the year. Because the very physical welfare of your family depends upon well-cooked food, in well ventilated houses. But if I am obliged to do all of my work myself, as I am, and as all of you women probably are, then I am going to plan it, to do it in the way that I can do it without wearing myself out. If some of you don't approve of it, why, that is your fault, and not mine. Now, for example, to go back to this question of ironing. I say that I believe in a system. It is necessary that we have a system in housework. I was a school teacher too long not to have a system. I cannot do anything except by system, and I have certain days for doing certain kinds of work, I do that work on those certain days, but if something happens which absolutely prevents my doing it, I am not going to be absolutely cast down and miserable for the rest of the week, because I will get another chance at it next week. There is always a new week to begin. Now, last fall one day, just when the autum was in its full glory, Mr. Romine came in, and said, "Don't you want to go out to the farm and see the hills, today? You don't know how beautiful they are." You know, we have a hilly country over in Indiana, and we have to go through those hills to the farm. "Oh," I said, "I don't know, I have a basket of clothes to iron." Now, it doesn't matter, you may leave out a great many things, but there are a great many things that *have* to be ironed. I said, "I have my basket full of clothes folded down to be ironed." It was morning, I was getting the dishes washed as fast as I could, the irons were on the stove, hot, all ready to iron with. He said, "Very well, then, if you can't go, all right." Then he went out to get ready, and I kept on washing my dishes, and thinking about those hills, and when I got the dishes washed, I shook out the clothes, and closed up the range real quick, and went out to the hills. And today there is nobody in the family that knows whether that ironing was done or not. And I don't care. [Applause.] But let me tell you something else that I know. Something beautiful. A picture that has stayed with me all this winter, and times when the days have been gray, and gloomy, and the snow has covered the landscape, you know, if I shut my eyes I can see the glory of the autumn hills, and the purple shadows between, and the gorgeous sunset, and the moon, as it came up through the trees—because we stayed all day, his work kept him all day—and it has been a picture that has been an inspiration to me all the year. Is not that better than a basket full of ironed clothes? [Applause.]

To be sure I might have looked at those clothes, you may spend your time ironing if you want to, and when you get tired out, open the drawer and look at those ironed clothes, if it will rest you any, it won't rest *me.* I look at the sunset, the purple clouds, the blue hills, the rippling brook, and I believe I will be a broader minded woman, that I will have a higher sense of my duty in the home, and a greater appreciation of the duty and dignity of homemaking, than if I spent my time in drudgery, from morning until night.

I don't want to degrade my home.
I don't want to belittle my home.
I don't want to neglect my home.
I could neglect my home, to lecture. But I am not going to.

Now, the woman who follows pleasure for a pursuit is not at heart a wicked woman. She simply is a woman with absurd ideas. She does not appreciate—and it is partly your fault that she does not appreciate—that she *has* any duties. That she has any business as a citizen. Why, do you know, we don't think of a woman as being a citizen. How many of you ever thought of a woman before as being a citizen? Now if we would talk to you about a citizen, you would say it is someone who has a right to vote. Now you have just assumed that. You think that you are citizens, and that you are the only citizens, because you have a right to vote, and you flatter yourselves that you are keeping the women from voting. You never were more deluded in your lives. All the men in the country will not keep women from voting when they get ready to do it. And why are not they ready, friends? Why are they not ready to vote? Why are they not voting? Because they have no appreciation, as a whole, of their civic duty. Why, do you know, we think of the woman who is interested in public affairs, as a ranter. As a woman who gets out and makes speeches, and uses hatchets, and all that sort of thing. [Laughter.] And we don't want our women to be like that. And the womanly woman shrinks from anything of that kind, of *course* we do. We don't want to bring ourselves into notoriety. But listen! The woman who has deep in her heart a sense of duty toward her fellow man, who has the true patriotism, that has its foundation in her love of home, I tell you, that that woman will recognize that there is a great work for her to do in the community, that can be done by no other hand than her own. Don't you know, that while women can do man's work, there never was a man on earth, who could do a woman's work? You say that is an assumption. Oh, no it isn't. No, that is a great truth, friends. Who wants to do a man's work, when there is such a great work for woman to do? Not I. Not I. I remember that when I was a small girl, I thought it must be a dreadful misfortune to be a boy. Somehow, I did not admire their dirty hands. I didn't think it was nice to like those snakes, and toads, and things of that kind—and I have that feeling yet. [Laughter.]

And I know this. I know that when there is a great reform started, and a movement for cleanness for a high standard of citizenship, that it starts with the *women* Just now, in your fair land of Illinois, do you know that the women of Chicago will have to come to that city's rescue? Haven't the men demonstrated that they are not able to cope with the situation? "Why," you say, "That is run by machines." "Ward politicians." What ward politician can cope with the influence of one good woman, with a high ideal of her civic duty? Talk about the power of voting. It is not to be compared with a woman's power, when she appreciates it. That is the great trouble. We do not feel that we have any relation to the community. You know, that comes back again to that old idea, that the home, when you are shut up in the home, why, that is just a circle, you are just supposed to go around in that, just in those four square walls, that is the only place you are supposed to be, or to have any interest. That is the position when we are neglecting things. You say, "Well, what are you going to do?" Well, I will tell you just one instance. Over in Indiana, there was a city which had for a mayor a man who was an insult to every woman in that town. His mere presence was a degredation to the home life of that place. I was there two weeks before election, and at that time a law in Indiana had been passed making the man mayor for four years. This man had held that place for six years. Previous to that time the term for the mayoralty had been two years, he had held his position for six years. Now he came up as a candidate for a fourth term, making ten years in all, that he held that position as mayor. And in the class one day, I saw a little commotion among the women, and after a while they called me back, class had not begun yet, and they said, "What do you think about the women taking part in public affairs?" I said I hadn't thought much about it. Well, they said, "We don't vote in municipal affairs, but we have a man for mayor here that we are not going to have in office any longer." I said, "Then I think his chances for being elected are pretty small." And they said, "Oh, we don't know whether we ought to take any steps in the matter or not." I said, "What is the condition?" They told me the condition, and I said, "If I lived in this town I would not stop, day or night until I was sure that man would be defeated. I would not have him in a place where there was such an influence." Well, they called a public meeting. Mind you, it was only two weeks before election. They called a public meeting, and they came out, the women had never spoken in public in their lives, but they got up a genuine enthusiasm; they called a spade a spade. They denounced the man as mayor, and said they were not going to beat about the bush, but they were not going to have him as mayor any longer. Then the good men of the town came out and helped them, but they helped with faint hearts, because they said, "Oh, the machine runs things here. We can't hope to defeat him because it was all cut and dried months ago. The machine is in power." Why. You talk about a "machine" as though its power was absolute. Women don't know anything about machines of that kind. It went on, the campaign went on; those good men didn't really want him for mayor, but you see he was nominated by the party, was the trouble, and of course you had to elect men whom the party nominated, regardless of his principles. This was a Republican town. No Democrat had ever held office in that town. Now the Democratic candidate for mayor was a clean man, his life was above reproach. The men all admitted that, but they said, "Oh, you can't elect a Democrat here." But I want to tell you, they elected a Democratic mayor by a handsome majority. The machines, ward politicians, unclean Republican nominee, were "Snowed Under," because women don't recognize "Machines" or ward politicians. This is what they will do some day, I am hoping, up here in your city of Chicago, when the bachelor mayor, the ward politicians, and the Republican machines, will all go under together. It never will, until you come to the rescue. You women.

If women could but realize, if you could understand, you women of America, that men look to you for inspiration, that men look to you for high standards. They go out into the world and fight the battles from which we are protected, and it is well that we are—but they expect the home to be such that they will get their inspiration and their strength at their own firesides. And if he does not, friends, then woe unto us. If the women of America could but awaken, and come into the heritage of their power, that power of woman which has been the greatest influence since the dawn of civilization, which has made and unmade kingdoms, if they would but come into that power and recognize that the manhood of America looks to them for pure inspiration, for high standards, and are dependent upon them for help to better things for our government, I want to tell you that such a wave of reform would sweep over our land as we have never yet dreamed of. Oh, I think that the time is not far away when it will come!

There are other things that we do sometimes, we women in our thoughtlessness. For instance, we women sometimes lose our power in our homes by forms of amusement. Do you know, I think it would be an utter waste of breath and time for a woman who plays cards three afternoons in the week, for a prize, to talk to her son or her brother, or her husband, against gambling. I think that would be a waste of time. I heard, not very long ago, of a woman who came home from a card party very much disappointed because she had not won a cut glass dish that was offered for a prize. Her 14-year old son heard her regretting it, he didn't say very much, but he loved his mother, and he hated to see her disappointed about anything. A few days after that he came home, bringing her a beautiful cut glass dish. She was perfectly amazed. She said, "Why, my boy, where did you get this?" He said, "I bought it." She said, "Well, where did you get the money?" He answered, "Throwing dice." The horror of that mother's heart was such that she realized then the example that she had been setting her boy, unconsciously. I tell you, there it is again. The life in the home, in its relation to the community. *No* woman's influence in the community exceeds her influence in the home. I know of a woman who spent her life in giving temperance lectures. Her son filled a drunkard's grave, and her daughter walked the path of the scarlet woman. And those two lives are crying out today. And the things that the woman said in her temperance lectures have long since been forgotten. Her influence in her home, you see, was greater than that she had on the public.

And now, for fear you may think that I believe that everything rests with the woman, I want to say to you fathers, to you men, that if you, by your indifference, by your acquiescence, by just simply neglecting what you might do, if you allow the foul blotch of the saloon to stay in your community, and don't tell your boy that is not the place to go, because it won't carry very much weight with him; not very much. If that is not a good place for him to go, why do you allow it to be there? Has not your boy the right to grow up clean and pure? And with clean surroundings? You say, "Well, it is good for him to be tempted." Oh, may be. There are enough temptations, even in his own soul. Things he has inherited from you, that he must overcome, so you need not put anything extra in his path. If he overcomes that from within, he will be a strong man.

Listen. Influence in the home, whether it is on the part of the king, or upon the part of the queen, measures your influence in the community. If you stand for clean manhood, if you live it in your hearts and in your lives, and if you women understand this relation of yours to the community, and if you always carry about in your hearts this beautiful ideal, those who live with you will unconsciously rise to it, they will not know why, but unconsciously they will come up to that standard that you keep for them, and then the relation between the home and the community is such as it ought to be, such as it was intended to be, and the influence that you have set moving, that wave of influence that you have started—perhaps you have no children in the home, but the influence of your home life upon those surrounding you, upon your neighobr, is like a wave that is started. You know when you drop a pebble in the depth of the ocean? These waves of influence that you have started, friends, will go on, and on, and not stop until they have touched the shores of eternity. I thank you. [Continued applause.]

Delegate—Mr. Chairman, I move that we tender a vote of thanks of the institute to Mrs. Romine, for this lecture.

Delegate—I second the motion.

Chairman—You have heard the motion, made and seconded. All in favor make it known by saying "Aye."

Delegates—"Aye."

Chairman—Unanimously carried. The members of the Illinois Farmers Institute tender a vote of thanks to Mrs. Margaret Mather Romine for the lecture given by her this evening.

Music ....Peoria High School

Adjourned.

MORNING SESSION, SECOND DAY OF THE CONVENTION.

General Session, 9:30 A. M., Feb. 12, 1908, Coliseum Building.

President Chas. W. Farr, Presiding.

Music.

President Farr—Now, ladies and gentlemen, because of our being a little crowded for time, I want to make some announcements while you are being seated, if you will give me your attention.

It becomes necessary to make a few changes in the program of this morning, or at least to make one change. It is necessary for Judge Humphrey to give his talk on "Alfalfa" this morning, instead of in the general section, tomorrow afternoon, and he will be the second speaker of the morning. Now, don't be confused in this matter. Dr. Hopkins will meet that section tomorrow afternoon just as advertised in the program. The only change is calling on Judge Humphrey this morning rather than tomorrow afternoon, but in Mr. Abbott's section Dr. Hopkins will talk tomorrow.

Don't forget the exhibition of the cow milkers on this platform at half past four this afternoon.

It has been suggested by the executive committee that in the morning we hear the reports of the directors, the reports that were crowded out, you will remember, yesterday morning, and then we will call for the reports of the committee on resolutions, tomorrow morning.

Now, any member of the convention who has any resolution which he wishes to have brought before this body, must bring it through the Resolution Committee; he must refer it to them, and they will act upon it and refer it to this body. Let us not be confused in this matter, because we don't want anybody to be disappointed at the last moment because of not being able to get his resolution before the house.

Because of the educational features of the meeting this evening, the committee has asked city superintendent of schools, of Peoria, Gerard T. Smith, to preside tonight.

We are very sorry indeed that because of his health and physical condition it is utterly impossible for Dean Davenport to be with us this morning. I have a letter from him in which he states that it is the greatest disappointment of his life not to meet this body of farmers at the present time, and to give us this talk. He has, however, put it in writing for us, and we are to be favored with it as read by Professor Blair, this morning. Applause.

Opening remarks by Professor J. C. Blair, introducing the written address of Dr. Eugene Davenport.

Professor Blair—Mr. Chairman, friends, and members of the Institute:

I bring to you this morning, greetings from your friend and associate, the Dean of the College of Agriculture, and, as Mr. Farr has already told you, it is the greatest disappointment of Dean Davenport's life that he could not be here in person, to look you in the faces and talk to you about the things he has written. It is a difficult thing, you must realize, for another speaker to take the manuscript of a speaker, and present it in a form that is entirely acceptable to the audience, but I will ask, however, that in following these thoughts of Dean Davenport, you will give me your closest attention, and I will try not to worry you more than is necessary.

Dean Davenport, during the many years that he has worked for Illinois, has done a great many good things. All of them have been good, some of them especially good, but of all of the efforts that our Dean has put forth, it seems to me that this is one of the best, so I will bespeak for him, and for the one who is trying to speak for him in this connection, your kind attention.

DR. EUGENE DAVENPORT.

This address is called out at this time because of the following reasons:

1. The work of the Agricultural Experiment Station is being greatly hampered and its usefulness to the State greatly reduced because the last General Assembly failed to make the increase in its funds requested by the farmers of the State.

2. This failure to increase appropriations was not from lack of belief in the importance of the work, but because the revenues of the State are insufficient to meet the demands.

3. This deficiency in revenues as compared with the needs of the State is growing greater and not less as the years go by, indicating the need of a careful study of the situation by those most interested, particularly as it is likely to affect the industrial and the educational development of the State.

I expect to show that deficiency in state revenues is unfortunate for the following reasons:

1. Because it leads to short-sighted and absurd economies.
2. Because, at best, the great bulk of expenditure of State funds is non-productive, while the first effect of shortage is to curtail the productive activities of the State.
3. Because deficiency in state revenues invites federal patronage and leads to the transference to the Federal Government of activities that properly belong to the State.

I also expect to show that deficiency in the revenue of the State is unnecessary for the following reasons:

1. The State tax is at most but a small proportion of our direct taxes and an insignificant fraction of our total contribution to the public need.
2. Our share of the federal tax (indirect) is many times our contribution to the State.
3. The federal government does not hesitate to expend money for improvements because of the growing demand for funds.
4. Our system of raising revenues depends too much upon a direct property tax and new and additional sources of revenue should be devised as is being done in other states.

After having shown these things I shall hope to enlist your sympathy with a plan for the systematic and permanent development of the natural resources of the State regardless of the demands from non-productive sources.

WORK OF THE EXPERIMENT STATION CHECKED.

I gave as the first reason for this address at this time that the work of the experiment station is suffering for the need of funds which were requested by the agricultural organizations of the State, but refused upon the score of insufficient revenue. A good illustration of this fact is in the work of soil investigation, for which this particular association stands sponsor. In the half dozen years during which this study of Illinois soils has been in progress the station has educated and brought together a remarkably efficient body of men for this particular purpose. It has also accumulated a mass of data that ought to be published and put in the hands of our farmers. Besides this, additional studies and demonstrations should be vigorously pushed—all of which requires funds. In the absence of additional funds one of three things must manifestly happen: We must either let men go as they become more valuable; we must cease accumulating data for which there are no funds to publish; or we must cease our productive work and spend the funds for publication. To do the latter would be to disband a most valuable body of workers for which the State has yet great need and which could not again be brought together without great delay and large cost. We have chosen therefore to proceed with the work, allowing the records to accumulate, believing that present conditions are only temporary, and that Illinois will find a way to do a thing that is so eminently profitable as to thoroughly know its soils. In the meantime there are in the vaults of the experiment station the data of the detail survey of thirty counties lying idle because there is no money for publication. I raise the question, does this pay? The demand for what we have already published has become so great that the mailing list has reached the number of 50,000, and the bulletin on soils now in press will cost nearly $2,000 for printing alone. Manifestly we cannot print much and do very much else, and it must be evident to every one that we have reached the point in the work of the experiment station where larger policies must prevail if the State is to be served to the highest capacity of the station.

What is true in the work of soils is true of other lines of station work. It is true also of the work of the College of Agriculture, in which the numbers of students have increased within the last ten years from nineteen to over five hundred. What is true of the agricultural interests is true of the university in general as could be abundantly shown; all of which means that the State is not at present keeping up with the pace it has set for itself and it is not providing the means for doing what the people have a right to expect and do expect of the State University.

DEFICIENCY IN REVENUE.

Appropriations requested of the last General Assembly would have pushed forward the work of the experiment station, equipped the station and the college both with buildings, and would have put Illinois so far in the lead of other states in this respect as to have left no reasonable room for comparison. These requests for additional funds met no opposition, so far as I am aware, upon their merits. Everbody said they ought to be granted; but there were twenty-two millions of dollars of desirable appropriations needed by the State, and at best only twenty millions of dollars of revenue. Although the Assembly appropriated over four millions of dollars more than any previous Assembly ever appropriated, no increase was made in the funds for the work of agricultural instruction or research, with the single exception of the study of destructive insects by the State Entomologist and of floriculture by the experiment station.

The following table shows the biennial appropriations for the last twenty years, and is evidence as to why the revenue of the State is falling behind the demands made upon it:

TABLE I.

Appropriations of the General Assembly of Illinois for the Biennial Periods 1889-1908.

1889-1890	$ 7,396,737 30
1891-1892	8,757,901 15
1893-1894	9,032,514 49
1895-1896	10,055,800 41
1897-1897	11,178,902 00
1899-1900	12,499,655 57
1901-1902	13,273,686 12
1903-1904	15,467,316 00
1905-1906	15,889,363 50
1907-1908	20,058,660 59

A glance at this table shows that agriculture is faring no better than it fared four years ago under an appropriation four and one-half millions less, and a revenue only four-fifths the present income of the State.

DEFICIENCY GROWING.

A dozen years ago when I came into this State I was told that the biennial appropriation was about eleven millions of dollars, and that it would not be much increased, so that whenever one interest received a larger appropriation than usual it would necessarily be at the expense of another. Evidently this principle was not sound and has been outlawed long ago, as it should have been, for the appropriations have nearly doubled since that time. A few years later those on the inside, noting the steady increase in the public needs of the State, agreed that each succeeding assembly would need to appropriate about one million of dollars more than its predecessor. This principle of finance seems also to have broken down, and our present assembly has found itself in the position of needing to exceed its predecessor by more than six millions of dollars of appropriation, and yet to have been obliged to turn down over two millions of dollars of desirable outlay because of insufficient revenue.

Now, the General Assembly is only indirectly responsible for revenue conditions. In the last analysis it is up to the people to say whether they will provide the funds needed to develop the State or whether they will sit still and be swamped by conditions that are creating themselves and cannot be reduced, but must be met. In other words, the time is at hand when serious consideration must be given to the financial situation of the State, if interests in which you are concerned are to prosper, for there is nothing to indicate that conditions will mend themselves.

The Effect of Deficiency in State Revenue.

In the introduction it was stated that deficiency in State revenues was unfortunate for three substantial reasons: First, because it leads to shortsighted and absurd economies; second, because at best the bulk of the money goes for unproductive purposes and any shortage would strike first at productive activities; third, because deficiency in State revenues invites federal patronage. Upon these three points permit me to give some evidence.

Deficiency in State Revenues Leads to Queer Economies.

Examples of this principle are not difficult to mention. A few years ago the State House roof leaked. There was a deficiency in the revenue, though it did not then amount to two millions of dollars. Many interests were clamoring for recognition, and as is common in such cases action moved along the line of least resistance. The appropriation for the repair of the roof was not made and it leaked two years more. Think of it! In Illinois the State House roof must leak because, forsooth, we have no money to fix it! Do you suppose it cost less to do it two years later after walls and frescoes were repeatedly soaked?

A new chemical building was needed at the university. It had been sorely needed for four years. The old building had been burned and temporarily repaired. The students had more than doubled in numbers and the least that could be done was to provide such a building as other similar universities already had at that time. Such a building would cost $200,000 if well built; but to save money the appropriation was cut in the middle, and the chemical building suffered at its most vulnerable point, safety from fire; and the building we have now with its wooden partitions is the worst fire trap on the campus.

A women's building was built at $80,000 and was too small for its purposes before it was finished.

Two hundred and fifty thousand dollars were needed for an auditorium where the university population might be assembled and where the musical interests of the institution might be properly housed. By this time the deficiency was growing greater, and a sentiment seemed to be forming that no building should cost more than $100,000. Accordingly one hundred thousand dollars were all that could be gotten for the auditorium. The result is a building that would not hold over 60 per cent of the students in actual attendance at the time the building was finished.

This is the kind of economy that invariably follows the attempt to do a thing with one dollar that really needs two dollars; the one dollar gets used, but it is not well expended—and, as in fixing the State House roof, dimes are saved at the expense of dollars later on.

The attendance at the university is five times what it was a dozen years ago, and yet at the last session of the assembly it was impossible to get half the buildings that were really needed to care for the students now in attendance, to say nothing of others that are to come. The result is that they are crowded together in quarters that would not pass inspection—and yet as matters are going now, where is relief coming? It will be another year before any appropriations can be made, and two years more before the first building could be occupied. Indeed, the buildings provided for a year ago have not yet been put on paper, because the State will not permit reasonable architect's fees; another result of the peculiar economy that sometimes takes possession of public affairs.

Now, nobody really wants things to go this way, and they would not except for the very peculiar tangle into which things have gotten because of defective revenue laws at a time when the State is rapidly developing and its resources are as rapidly increasing.

Of our twenty millions revenues the current two years, we raise some six million dollars annually by direct property tax at a valuation of about one and a quarter billions ($1,251,974,306 increased from $1,126,663,157 of 1906), at a rate of fifty cents on $100 valuation. To have raised the other two million would have necessitated raising the tax levy from 50 cents to at least 70 cents, an act that would at once subject the administration to the fiercest criticism—a criticism that few would care to face. It is easier and safer to submit to the inevitable.

So things will continue as they are until they get intolerable unless those who can do so address themselves to the problem and its solution. Matters of this kind do not mend themselves, and this particular case is one that for reasons already given, must have help from outside political circles. Hence I put it up to you, as being one of the bodies to move in the matter and as one who can move, and I ask you to study the problem seriously because your interests are among the first affected.

In studying problems of this sort we must accustom ourselves to a new range of values. In our personal affairs we deal with dollars in terms of hundreds and occasionally thousands, but in dealing with matters of public finance to deal with thousands and millions of dollars, and occasionally we reach the billion mark. We must deal with these new terms soberly, not run away from them with a feeling that they represent extravagance. They are real dollars and they represent real expenditures for real needs. With this in mind let us consider together some of the characteristic facts about State expenditures and revenues, remembering that whether values are small or large, all things are relative.

THE BULK OF STATE EXPENDITURES GOES FOR NON-PRODUCTIVE PURPOSES, BUT THE FIRST TO SUFFER IS THE PRODUCTIVE.

For present purposes the State expenditures may be roughly classified as follows:

1. Governmental.
2. Primary education.
3. Support of the insane.
4. Support of the penal institutions.
5. Support of defectives.
6. Support of other dependents.
7. Higher education in the university and the normal schools.
8. Research and encouragement of prominent industries.

Of these eight classes of expenditure all are non-productive except the last two. The only exception to this statement that could be taken would be with reference to primary education, but at our stage of civilization this cannot be called so much developmental as a protection against abject ignorance anywhere, and an assurance of at least a low degree of universal intelligence.

The expense of support of the State government is one of those fixed charges upon a civilized society that are not to be avoided but met and discharged as a first duty of citizenship. Accordingly it does not enter into our discussion here, which has to do with those voluntary duties that the State has assumed from considerations of humanity and with a view to further economic development of the State and its people.

The restraint of the criminal is a burden that society has taken upon itself. It is far more costly than the old-time primitive method of destruction. It is also more civilized, but it is none the less non-productive. The care of the insane, of defective, and of other dependent classes is a most worthy charge upon the State. We certainly are more human in this respect than were our predecessors, who left them to wander as helpless unfortunates, a menace to society until death relieved their sufferings. But, worthy and necessary as is their care, it produces nothing and the money that goes into the care of the insane and the training of defectives is at best only protective. It adds nothing to the constructive policies of the commonwealth, and nothing whatever to the producing power of the State.

The only expenditures that will make us stronger and better as a people are those that go into the *development of the industries of the State and the higher education of the best people.* These expenditures are those that have gone and are going into agriculture, into the various commissions whose business it is to report upon advanced policies, and into the support of the university and the normal schools.

The following data will give some idea of the expenditures for the care of the non-producing portion of our population as compared with those that go to the upbuilding of the State, and which will therefore be called productive:

TABLE II.

Amounts Appropriated on Account of the Care of Insane in Illinois, 1907-1908.

Jacksonville Central Hospital for the Insane	$ 996,500
Kankakee, Eastern Hospital for the Insane	997,400
Elgin, Northern Hospital for the Insane	552,300
Anna, Southern Hospital for the Insane	670,400
Watertown, Western Hospital for the Insane	540,000
Bartonville, Asylum for Incurable Insane	855,000
Menard, Asylum for Insane Criminals	84,400
	$4,696,000

TABLE III.

Amounts Appropriated on Account of the Penal Class, Illinois, 1907-1908.

Pententiary—Joliet	$ 512,000
New site	500,000
Penitentiary—Chester	430,700
Reformatory—Pontiac	723,400
Conveying prisoners	86,000
Apprehending fugitives	37,000
Board of Prison Industries	40,000
	$2,329,100

TABLE IV.

Amounts Appropriated on Account of Defectives, Illinois, 1907-1908.

Illinois Industrial Home for the Blind, Chicago	$ 93,000
Institution for Education of Blind, Jacksonville	126,200
Illinois School for the Deaf, Jacksonville	300,000
Asylum for Feeble Minded Children, Lincoln	453,700
Total	$972,900

TABLE V.

Amounts Appropriated for Dependents not Insane, Penal or Defective, Illinois, 1907-1908.

Soldiers' and Sailors' Home, Quincy	$ 658,386
Soldiers' Widows' Home, Wilmington	46,800
Soldiers' Orphans' Home, Normal	165,322
Illinois Charitable Eye and Ear Infirmary, Chicago	113,863
Training School for Girls, Geneva	306,531
St. Charles Home for Boys, St. Charles	378,500
Total	$1,669,402

TABLE VI.

Amounts Appropriated for Higher Education, Normal Schools and University of Illinois, 1907-1908.

Northern Illinois Normal School, DeKalb	$ 146,000
Eastern Illinois State Normal School, Charleston	227,000
Western Illinois State Normal School, Macomb	139,000
Southern Illinois Normal University, Carbondale	166,987
Illinois State Normal School, Normal	262,987
Total normal schools	$ 941,974
Exclusive of new buildings	250,000
	$ 691,974
University of Illinois*	$2,223.290
Less research	382,000
	$1,841,290
Less new buildings	435,000
	$1,406,290
Total for higher education	$2,783,264
Exclusive of new buildings	685,000
	$2,098,264

TABLE VII.

Amounts Appropriated for Research in Illinois, 1907-1908.

Agricultural Experiment Station	$ 205.000
Engineering Experiment Station	150,000
Ceramics	15.000
State Entomologist	84,500
Educational Commission	10,000
Internal Improvement Commission	20,000
State Geological Survey	65,000
Highway Commission	100,000
Total research and report	$ 649,500

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*Exclusive of U. S. fund.

TABLE VIII.

Amounts Appropriated for Development Aside from Research, Illinois, 1907-1908.

Dairymen's Association	$ 5,000
Live Stock Breeders' Association	1,000
Poultry Association	2,000
Levee at Shawneetown	17,000
Farmers' Institutes	32,000
Horticultural Society	10,000
Milk Producers' Association	1,000
State Library	48,000
Superintendent of Public Instruction	23,200
State Board of Agriculture	189,440
Total	$ 328,640
Total for development by research	$ 649,500
By means other than research	328,640
Total	$ 978,140

TABLE IX.

*Amounts Appropriated on Account of the Non-Producing and the Producing Interests of Illinois, 1907-1908.**

		%**
Insane	$4,696,000	23+
Penal	2,329,100	12—
Defectives	972,900	5—
Other dependents	1,669,402	8+
Total non-productive	$9,667,402	48+
University	$1,841,290	9+
Normal schools	941,974	5—
Research	649,500	3+
Development other than research	328,640	1½
Total productive	$3,761,404	18½

Here in Table 9 we have a picture of the whole matter so condensed and focused as to be easily seen and comprehended.

We note, I am sure with surprise that over four and a half millions of dollars are required biennially for the care of the insane—those poor unfortunates who matured with promise and commenced life but found it too hard for them. Over twenty-three per cent of all our State expenditures goes to the care of these, our weaker brethren who have fallen by the wayside. We would not do otherwise, and yet we do not close our eyes to the fact that it is all dead money, for it is non-productive and adds nothing to the developmental energies of the State.

Again there is nearly two and a half millions of dollars, or twelve per cent—one-eighth of all our taxes, for the penal class—these wayward ones who make war upon society, who do not believe in civilized conditions and would pull us down if they could. These must be restrained but it is frightfully costly.

Then there are the defective children, the deaf, the blind, and the feebleminded, who perchance, by careful methods may be made partly, at least, self supporting, but they cannot be productive. We cannot build a state upon such as these but we willingly contribute the million dollars for their betterment and the softening of their lives.

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*Not including Board of Public Charities—$37,000. **% of total taxes of the State.

Last of all are the "other dependents"—not insane, not penal, not defective, but non-productive—the occupants of our various "homes." A worthy charge is this, but it costs us over a million and a half dollars. Now these are all fixed charges upon our funds to be added after the cost of government, and before we can think of anything developmental. And the sum is perfectly appalling—$9,677,402 for the current biennium, over forty-eight per cent of all State appropriations and a little more than is raised by direct property tax, aside from the primary school fund.

Compare with this, the productive outlays:

The University heads the list with a large sum, and yet it is less than the running expenses of the penal institutions of the State. The total outlay for higher education in both the university and all the normal schools ($2,783,264) is but slightly more than the cost of the defectives and other dependents ($2,651,302), aside from the insane and the penal.

The amounts expended for research in the broadest sense of the term ($649,500) are but a quarter of the cost of the penal institutions, and all that goes for development in any sense of the word aside from higher education ($978,140) is less than goes to the education and care of our defective children.

Last of all, the entire amount that can by any stretch of the imagination be called productive in the sense of being developmental ($3,761,404) is nearly a million dollars less than the insane alone cost us.

And that is not all. These amounts can be counted on only when there is a surplus after the others are satisfied. This particular biennium our revenues are exceptionally large, being between four and five million greater than for any previous biennium. Some of this increase was due to increased valuation but much of it was temporary and cannot be counted upon again.

With these facts in mind what is the next deficiency likely to be?

The care of the insane, the penal, the defective and the dependent constitute fixed charges that must be met and settled with at any cost. We cannot turn these people adrift. More than that they are increasing upon our hands at a constantly augmented ratio. Table 10 shows that ten years ago the appropriation for the care of the insane was $2,245,554, or twenty per cent of the total, instead of $4,696,000, or twenty-three per cent. That is to say the cost of the insane has more than doubled in ten years, and raised from twenty per cent to twenty-three per cent of our total State expenditures.

TABLE X.

Certain Appropriations, Illinois, Ten Years Ago, 1897-1898.

		Per Cent.
Total appropriations	$11,178,902	
Insane	2,245,554	20
Penal	1,286,356	11
Other dependents	1,203,500	11

The cost of the penal institutions has also doubled in ten years, and increased from eleven per cent to twelve per cent of the total. The cost of the dependents has more than doubled and increased from eleven per cent to over thirteen per cent.

Herein the rapidly increasing demands of these fixed charges upon society is reason enough for our increasing deficiency in revenues. It means that the dependent classes are increasing faster than the State is developing; faster than the increase in its tax paying resources so far as we have yet tapped them. I shall show later how inadequately we have as yet drawn upon these revenues, depending too largely upon the direct property tax.

It costs the state of New York to care for her insane over five and one-half million a year ($5,695,103) or eleven millions in two years against our four and a half millions.

It has cost the state of Michigan as much since its admission as a state in 1837, to care for its prisoners as the total cost of the state university, and the insane have cost nearly as much as both of them.

Evidently there is no natural relief in this direction and as the State grows older we shall face yet larger demands from our dependent and non-productive class. Now, these demands will need to be met, and if they do not entirely swamp us and our productive activities it will be only because thinking men take early and vigorous action.

A New Plan.

Now, I propose a new plan at this point: that we take this matter as a business proposition. My plan that I put up to you is this: *That every time we put down a dollar to care for the defective, dependent and non-producing classes we put down another dollar to develop the state in the person of its best citizens, its natural resources and its productive industries.*

Is not that a fair proposition? Is any other policy safe? Will any other policy assure a future and a productive energy sufficient to bear the burdens of civilization? For what we have as yet discussed is but the merest drop in the bucket of the public burdens that the producing energies of our people bear and must continue to bear.

I have proposed a dollar for a dollar plan—a dollar for development against every dollar for support of the non-producers. In other words I propose that you put as much into the state university as it costs to care for the insane; that you put as much into the normal schools to train our teachers as it costs to care for our penal institutions and that you devote as much to research and encouragement of productive industries as you put into other dependents.

If you will do this you will set in motion powerful forces that will operate constructively for the State; if you do not, you will continue in the present uncertain position, fighting the tide with a teaspoon. We cannot close our eyes to the facts in this matter. State revenues must increase, the demands that cannot be escaped will force it. The only question is, will we meet it like business men and voluntarily provide the needful as well as the necessary things.

The only thing that stands in the way is the bugaboo of taxation, which some way shows larger and more threatening in State affairs where it is smallest than anywhere else where it is largest.

Insufficient State Revenues Leads to Federal Patronage.

The well known difficulty that states encounter in getting sufficient revenue because of political entanglements is leading to a most unfortunate attitude toward the federal government. Only recently a federal officer pointed out in an address how much easier the general government could raise revenues than could the states, because its taxation is indirect. I shall allude at length to this matter later, but my present point is that this officer pointed out that Congress appropriates more money than all the states combined, and he made the more ready revenue an argument for undertaking more things by federal aid or support.

Now, in-so-far as this is an argument for secret taxation, I say it is absurd. It is equivalent to saying of the people of Illinois, "Here is a people that knows not what is good for them, or if they do know they have not the courage to tax themselves to get it. Behold, we will tax them in ways that they will not discover, and we will do these things for them—with their money of course, but not knowing it they will remain quiet and well pleased."

Rest assured that every dollar expended comes from somewhere. The people of Illinois are not children. They know that federal support means federal inspection, and they know enough to know that as they are to pay the bills anyway they better boss the job. No, friends, the argument that federal funds come easy and cost nobody anything is equivalent to inviting a stranger to put his hand in our pocket when we are not looking and then to surprise us with a present of the proceeds, less the cost of collections. We cannot afford to live in a fool's paradise in this matter. It is for Illinois' people to find out Illinois needs and meet them in a business manner. I desire to find out Illinois needs and meet them in a business manner. I desire to show you now that these deficiencies in our State revenues are entirely unnecessary, and their removal exceedingly easy, so that you can carry out large plans for State development if only you will set about it and do things that ought to be done—not merely those that must be done.

DEFICIENCY IN STATE REVENUES IS UNNECESSARY BECAUSE THE STATE TAX IS AN INSIGNIFICANT FRACTION OF OUR CONTRIBUTION TO THE PUBLIC NEED.

The bugaboo of State taxes would vanish in thin air did it not afford the most favorable material for making and unmaking political reputations. As a matter of fact the revenue needed to conduct the affairs of the State is a relatively trivial matter.

HOW THE STATE COMPARES WITH LOCAL TAXATION.

The following table exhibits the relative amounts raised for State and for local purposes in Illinois in 1905, the latest date for which full data are available:

TABLE XI.

*Proportionate Taxation for State and for Local Purposes, Illinois 1905.**

State tax	$ 5,568,310 23
County tax	8,177,625 79
City tax	12,404,379 53
School taxes	21,608,215 62
Road and bridge tax	4,099,451 53
Registered bond fund	768,852 72
All other	10,074,245 91
Total	$62,701,081 33

By this we see that in 1905 the total taxes collected within the State for all purposes was a little over sixty-two millions, of which only five and one-half millions or less than one dollar out of every eleven went to the State. Now, this means that for every dollar we voluntarily assess ourselves for local purposes we pay only ten cents into the State treasury.

Why, bless you, it is our local taxation that counts. The State tax is insignificant. The State tax levy is fifty cents on a hundred dollars, but the local tax rate $5.73. In this same year of 1905 the county of Cook alone raised twice as much for county and city purposes as all the State taxes combined, and then as much more for school purposes. The total tax raised for local purposes in this county that year was over five times the total State tax, and the comptroller this year recommends a budget ($24,000,000) for Chicago alone that is 20 per cent higher than all the State appropriations for the current biennial period, or fully four times the present annual State tax levy.

The following facts are extremely significant:

1. One-third of all our taxes is for local school tax that we vote upon ourselves.
2. One-fifth is city tax that we vote upon ourselves.
3. One-eighth is county tax that we vote upon ourselves.
4. One-fifteenth is road and bridge tax that we vote upon ourselves.
5. Only one-eleventh goes to the State for all purposes.

Surely it ought not to be necessary to let the state house roof leak, to build inadequately or to forego needful research when the amounts involved are so insignificant as they seem to be the moment they are put in their true and proper setting.

Two or three millions of dollars standing alone in the abstract is a mighty sum, but compared with the amounts that must be used, and with the earning power of a great people it is but a trifle.

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*Latest date for which full data are available.

OUR CONTRIBUTION TO THE STATE IS NOT ONLY SMALL AS COMPARED TO LOCAL TAXATION: IT IS INSIGNIFICANT AS COMPARED WITH OUR SHARE OF FEDERAL EXPENSES.

When we are practicing our small economies in State affairs I wonder how many understand what happens when Congress appropriates a billion of dollars. We passed the billion dollar mark ten years ago in Federal finances, with no prospect of ever again dropping below it, for national expenses are rapidly and steadily increasing as is shown by the following table:

TABLE XII.

Appropriations of Congress for Federal Expenses.

1891	51st Congress	$340,191,868
1892	51st Congress	381,045,659
1893	52nd Congress	368,442,076
1894	52nd Congress	378,880,120
1895	53rd Congress	349,863,499
1896	53rd Congress	348,881,061
1897	54th Congress	358,840,545
1898	54th Congress	370,257,777
1899	55th Congress	728,886,513
1900	55th Congress	524,187,970
1901	56th Congress	522,864,852
1902	56th Congress	535,723,877
1903	57th Congress	541,360,526
1904	57th Congress	521,436,890
1905	58th Congress	527,131,437
1906	58th Congress	549,078,097
1907	59th Congress	610,510,566
1908	59th Congress	628,625,763

OUR SHARE OF FEDERAL OUTLAY.

We see by this that it will require no less than 628 millions of dollars to meet the federal needs for the current year, an increase of over 70 per cent in the last ten years. Now, what really happens when Congress appropriates this vast amount of money? It is not my intention to spring a tariff discussion on this matter, and I am going to head it off by saying that this money must come from some source. If, as we flatter ourselves, we take it and did not use it for public purposes, we could divide it among ourselves. Anyway, we figure it, here is an enormous amount of money that comes out of us either directly or indirectly.

Suppose for the amount that we were to pay this in a different tax as we do in the case of the State revenues; or suppose it were to be divided, what would be our share of this vast sum that is required to meet the needs of the nation for a simple twelve month?

Now, we of Illinois constitute almost exactly one-fourteenth of the population of the United States, and it is fair to assume that we are at least a fair average so far as buying and paying power are concerned.

What then is our pro rata share of this six hundred and twenty-eight millions of dollars? What would we have to pay if it were to be raised by direct taxation? What would be our share if it were not needed and could be distributed? That is a fair way to determine what our share of the Federal outlay really costs us, as compared with our contributions to the public need. Now, one-fourteenth of six hundred and twenty-eight millions of dollars is no less than forty-four millions.

It will be remembered that our General Assembly has appropriated twenty millions for the years 1907-8. Congress for the same time has appropriated over 1,239 millions, our share of which is over eighty-eight millions, or more than four times the total expenditures of the State.

In the year 1905 just mentioned, we found that some sixty-two millions of taxes were raised within the State for all purposes, local and State, only five and one-half millions of which were for the State. That year Congress appropriated the sum of 527 millions, our share of which was nearly thirty-eight millions, or more than 60 per cent of all the taxes of the State, general and local, and nearly seven times the revenue of the State raised by taxation.

Summing up the facts we may construct the following:

TABLE XIII.

The Relative Amounts of State, Local and Federal Taxes.

For State purposes	$ 1 00
For local purposes	10 00
For federal purposes	7 00

The meaning of this table is simply this—that every time we contribute one dollar to State purposes we pay ten dollars for local purposes, for which we assess ourselves, and seven dollars for Federal purposes.

How insignificant this dollar looks! Why, then, all this fuss about State taxes? Simply this: we vote our local taxes ourselves, and there is no one but ourselves to blame. Moreover, no political significance attaches to the matter whether they are high or low. Again, the funds are scattered in many sums, and large amounts never appear to attract attention.

On the other hand our contribution to the Federal outlay, though seven times our contribution to the State is of the nature of a secret tax, and if we pay it we do it indirectly and do not know it.

But the poor State takes its little toll by the direct and visible method closely connected with personal politics, and for this reason the State will get squeezed between the upper and nether millstone till some power outside of politics steps in to afford relief.

In order to emphasize the comparative uselessness of some of our small economies I am desirous of asking your attention to some of the items of this 628 million dollar outlay for Federal purposes the current year. It may be of interest to remark in passing that these appropriation bills alone fill a large quarto volume of 574 pages, giving some idea of the magnitude of large things. I may add that the naval appropriation bill covers 54 pages of this volume, and the war department appropriation, including river and harbor improvement, covers 124 pages.

TABLE XIV.

Certain Federal Appropriations for 1908 and Illinois' Share of the Expense.*

	Appropriations.	Illinois' Share.
Total for the year	$628,625,763	44+ millions.
War department	176,116,606	12+ millions.
Navy department	100,511,051	7+ millions.
Rivers and harbors	43,000,000	3+ millions.
Transportation of army	17,159,091	1¼ millions.
Indian affairs	10,464,384	$750,000
Dam on the Rio Grande	1,000,000	70,000
Target practice, army	1,300,000	100,000
Ammunition, army	648,000	46,000
Agricultural department	9,447,290	670,000
Valuable seeds	241,633	17,000
Support Sioux Indians	622,000	45,000
Education Sioux Indians	200,000	15,000
Indian schools	4,173,680	300,000
U. S. penitentiaries	520,720	37,000
Insane hospital	305,800	22,000
Public schools, District Columbia	2,424,609	172,000
National parks	628,165	45,000
229 post office buildings	11,703,359	836,000
Smithsonian institution	1,593,116	113,000

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*An increase of 70 per cent in ten years.

In all this I must not be misunderstood. I am not criticising the character of the magnitude of these appropriations. On the contrary I am accepting them as embodying the broadest wisdom, and the ripest judgment of our most experienced men—men who have learned by experience what it takes to build and maintain a nation. In my opinion we do well to imitate their example in State affairs, as we should certainly do were it not for our unfortunate means of raising revenues.

Here is food for reflection and comparison with State affairs, particularly when we note the very large share that we of Illinois inadvertently play in the whole matter and when we consider the fact that these amounts represent the result of long continued experience with the larger relations of life and the deliberate judgment of what is needed to really conduct the affairs of a people.

A few instances will help us to better realize what these large figures mean. For example, our share of the whole budget is more than the total outlay of the State for all purposes for four years, and more than seven times what we raise by direct taxation for State purposes.

Our share of the war department appropriation (twelve millions) is more than the entire outlay of the State of Illinois for the same length of time, and our share of the war and navy together is twice as much.

We are just informed* that the military estimates before the present Congress aggregate 427 millions, or more than half the visible Federal revenues. Our share of this alone would be over thirty millions. It is only in this way that you realize what it really costs to maintain the big stick, even in time of peace. And yet what are you going to do about it? Are we going to abolish the big stick and let somebody run away with us some fine day? Those who ought to know most about it say not. The estimate for building and converting war vessels next year is seventy-four millions, our share of which would be over five millions. Thirty-eight millions of this is for four new battleships—at nine and one-half millions apiece. Evidently, something must be done when we remember that every boat in Admiral Evan's fleet going to the Pacific was built since the Spanish war. Even the famous Oregon is out of date now and near the junk heap.

Everybody knows that we have no military worth mentioning in comparison with the great standing armies of the world. Yet it costs something to maintain it. The appropriation of the war department is about evenly divided between "public works," and "military establishment," which represents the army expenditures. This latter is something over eighty millions for the current year, our share of which is almost the same as our total State tax for the same time.

Seventeen millions are needed this year for transportation of the army. Our share of this is nearly one and a quarter millions, which is more than we put into the State University and all the research work of the State combined for the same length of time.

Our share of the cost of the target practice of this army is $100,000 a year, which is as much as the State was willing to put into a chemical laboratory for the instruction of our present 4,000 students and others still to come.

Indian affairs cost us three-quarters of a million a year, or nearly twice our support of the Normal schools. Now, I am for the Indians, from whom we have gotten a lot of raw material and no little experience. But I am for Illinois people too. Do you know that our share of the cost of Indian schools is $300,000 a year, or a good deal more money that this State is putting into the development of its agriculture?

Do you know that we are not putting as much money into the study of soils and crops combined as our share of the cost of ammunition for the army in these piping times of peace?—($46,000).

I am prepared to maintain before any tribunal that we ought to put as much money into the study of Illinois soils as our share of the support of the Sioux Indians, ($45,000). Isn't that a fair proposition? But if you do it you will do almost what this association asked and double the present appropriation.

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*Chicago Tribune, February 7, 1908.

You have all heard of these new and valuable seeds that come in little packets about planting time bearing the local congressman's frank. Do you know that our share of the cost of these stock seeds is over $17,000 a year, which is about what you are putting into the horticultural development of the State?

Besides the support of the Sioux Indians our share of their education is $15,000 a year, which is the exact amount you are putting into the development of the dairy interests of the State.

Now, the District of Columbia is Federal territory, and there are children there to be educated. Our share of the cost of these public schools is $173,000 a year, or more than you appropriate to the agricultural college and experiment station combined.

The Federal appropriations to the agricultural department of Washington are nearly nine and one-half millions of dollars. Your share of this is the modest little sum of $670,000. Now, this is more money than was ever appropriated to the State University before the last session of the General Assembly, and it is more than four times what you appropriate for the agricultural college and the experiment station both.

With a few facts of this sort before us there is argument in doing things through Federal channels. Are you going to continue to neglect the interests of the State after this fashion? Or are you going to insist that the home interests shall be looked after on a scale which shall compare somewhat favorably with the way men do things elsewhere?

Is there any reason why Illinois cannot afford to put as much money into the development of the agriculture of the State as her share of the cost of maintaining the Federal department of agriculture? Can she afford not to do it? Russia is the best modern example of a people that was taxed for generations for central purposes without regard to local development, and we find that they have already reached the limit of taxing power and are going backward.

We, in this country, feel as yet no burden of taxation. That is because the cost of our military is small, and because we have a great body of virile people engaged in productive industry in a new country. But our population has doubled four times in the last hundred years. If it should continue at that rate another hundred years, we shall have in this country more than a thousand million of people. How many of them will be insane, how many penal, how many defective? What will be their power to earn money, pay taxes, and take care of themselves? There will be no scarcity of labor problem then. It will be one of maintenance and world supremacy in food and trade. *What they can do then will depend much on what we do now;* whether we establish and maintain policies that shall put adequate amounts into development of our productive resources in men and materials, or whether while our country is new we allow ourselves to drift. Think on these things and decide whether you will make a policy of your own in this matter. Whether you will depend upon Federal authority to do it for you or whether you will go on without one. If I do not misjudge the character and temper of Illinois people, I will predict you will make a policy yourselves, and take a little more of your own money, keep it at home and develop the State to the end that its earning power shall be increased and the burden of taxation grow less instead of greater as generations come and go.

FEDERAL IMPROVEMENTS.

One more lesson comes from these Federal appropriations. You will note that tremendous as are the demands from non-productive sources, the Federal authorities do not neglect or refuse to spend large amounts for constructive policies and internal improvements. This I take it is statesmanship. For example, no less than forty-three millions will be spent this year for river and harbor improvement, our share of which is three million. A dam on the Rio Grande will cost a million dollars. You never heard of the dam before, but our share of its cost is $70,000. That is about what you are putting into engineering at the university. I think you could well double it, and better still afford in the long run to quadruple it. The scheme of national parks and the forest and game preserves is one of the most far-reaching and foresighted bits of statesmanship of this country. It ought to have begun sooner and been carried further. Our share of the expense of it is $45,000 this year. Let us duplicate it at home and have more Fort Massac to mark historic spots—more things to make the State beautiful.

And so we might continue indefinitely and examples would never fail to show that of all our public expenditures those of the State are most inadequate and show the least of statesmanship. This is not because of disinclination on the part of our public men, but it is because no adequate system of revenues has ever been adopted and the State is always poor; literally starving between fatness on both sides; crushed between the upper and nether millstones of local expenditures on one side and Federal on the other until its efforts to cope with the situation are really pathetic.

ILLINOIS CONDITION.

Illinois undertakes to raise about half its revenues by a direct property tax, one of the most invidious and dangerous methods of raising revenue ever devised except for local purposes. To make the matter worse in our case the Governor, the Auditor, and the Secretary of State are charged by law with the duty of fixing the tax rate. Manifestly this is a difficult and dangerous thing to do if it calls for much increase. Now, for various reasons, we happen to have this biennium about four million dollars more revenue than ever before, and yet we were over two millions short of what we ought to have had. Now, part of this increase in revenue was due to special cases dug up by our Governor. In the nature of things such funds are temporary, not permanent, and not to be depended upon. We cannot count upon all these funds next time. In the meantime new needs will arise, and old ones will increase. The two million deficit will become greater instead of less, and where will be our funds for developing the agricultural and other productive industries of the State? I have shown already the rapid increase of non-productive expenses, and the only hope for the productive is in more revenue. Is not my proposition sound, of a dollar for development against every dollar for the non-productive classes? If it is, you need to bestir yourselves as to revenues or you will not realize it this side the millennium.

Nobody more than the farmer is warranted in getting into the State revenue matter. He pays more than his share of any direct property tax. Every acre, every calf and every pig is visible to the assessor. It is not always so. One can hardly resist the temptation to have fun with assessments. For example, they have no melodeons or organs in Cook county. They have pianos, but they are a cheap lot, worth only $13.67 for taxable purposes. Their sewing machines are worth only $2.23. They have only 20,308 clocks and watches to tell the time of day. Think of that for such a population. How inconvenient to depend upon the noon mark in such a smoky city as Chicago. Then the timepieces are not good, being worth only $2.70 apiece. But hardships and poverty are not confined to Cook county. I notice that down in Brown county they have one dollar's worth of silver and plated ware. I should like to meet that man in Brown county and congratulate him.

Of course, we ease the wound of assessment by taking only one-fifth for taxation. Isn't that childish? What difference does it make whether we pay on all or only a fraction of our assessment? It is a pro rata matter anyway; but it shows the fear of the property tax and the anxiety of the public official to mimimize its appearance.

So we hammer down our assessments and cut them in two and it is no wonder that our assessed valuation is below that of either Michigan or Wisconsin, and despite our heroic efforts the last two years to let no guilty man escape our assessed valuation is not yet equal to that of New Jersey.

Now, the significant fact for you farmers to ponder is this: I find no State of consequence in which so large a proportion of the revenue is raised by direct taxation. New York appropriated two years ago over fifty-three millions against our less than sixteen millions. It reports a total annual revenue of over thirty-nine millions *only one and a half millions of which is raised by direct taxation.* That is to say, their revenue is about four times ours, and their tax levy only one-fourth as much.

Here is more food for thought, and you must do some of the thinking if you would see Illinois in the long run, prosperous. I do not pretend to know the best means of raising State revenues. That is for the citizens of this imperial State to find out. A study of other states will help, and you are fortunate in being able to listen tonight to Dr. David Kinley of your own university, who will address you on this exceedingly important subject.

When you have heard him, then I beg of you, think it out; and when you have thought it out, then I beg of you again that you demand an adequate State revenue, to the end that the growing needs of the insane, the penal, the defectives, and our other dependent and non-productive classes shall not prevent the State from undertaking a broad and generous policy of public improvement and making it its first real business to provide the best obtainable for the higher education of the best people and the development of the natural resources and the productive industries of the State. [Applause.]

Chairman—The next subject for our consideration this morning is "Alfalfa," by Judge J. Otis Humphrey. [Applause.]

"ALFALFA."

(Judge J. Otis Humphrey.)

MR. CHAIRMAN, LADIES AND GENTLEMEN—Just a word, first, about the history of this marvelous plant. Some of you have an idea that it is a new thing in plant life. It is rather new to us, but it is not new in history. It was known and used before the birth of the Saviour. The Romans fed it to their horses. From Italy it was carried into Spain. Spanish invasion took it into South America. From Chili it drifted into California. This was in the last century. England got it a little earlier, carried over from France. We learn that about 1765 a farmer in Kent had fourteen acres of it and "that they did say about it that it had great value to increase the flow of milk in kine." The Californians got it in 1854, and it has been growing luxuriously there ever since.

Now, the more arid regions like those of Colorado and Kansas, perhaps, are its best home, but it can be grown here in Illinois. Some of us are growing it.

I was asked to open the discussion following the exercises by Dr. Hopkins tomorrow afternoon, on this great plant, but as I cannot be here tomorrow I have been asked to say a word now, and he will give you some of its history, its chemical properties and what it will do. I am simply to talk for a few moments about growing it here in Central Illinois, as I have been doing.

Five years ago I began to grow alfalfa, under the direction of Dr. Hopkins, and I have succeeded at it on a Sangamon county farm.

It is to plant life a good deal what the turkey is to the poultry yard—exceedingly weak at first and hard to start, but very strong in maturity. I have sown this plant at all seasons of the year, from April until August, with success. I think the best time to sow it is as early in the spring as the ground is warm enough to sprout it and all danger from frost is over; I mean to say, frost that would freeze the plant in the earth. I have planted oftenest the last week in April.

Alfalfa has a small seed. The seed bed must be made so perfect that the earth will come in contact with the seed at every point. You can't get too good a seed bed for alfalfa. I say to my men, "You go and make a perfect seed bed." And after plowing the ground, disking it and harrowing it until they say that it is just as good as a garden, I tell them to go and work it just that much more. I sow it after a drill. I want every seed of it covered. And it all comes up.

Delegate—How deep?

Answer—It sows like clover and timothy seed, behind the drill, and it will cover all that is necessary to cover it.

Question—Do you run it through the holes?

Answer—Oh, no, I don't run it through the holes.

Delegate—What kind of soil?

Answer—Any soil that will grow corn or wheat. It won't grow in the bottom, where water stands.

Delegate—Judge Humphrey, put red clover in with that corn and wheat.

Judge Humphrey—Very well. Any soil that red clover will grow on. Now, it is a nitrogen gathering plant, as you know. The reason why it is so hard to make a start is that it has no power to gather the nitrogen except through the sympathetic operation of the bacteria that attach themselves to the roots. Therefore, it must get some roots, get some nodules, before it can begin supporting itself from the air, and it must live while it is making this little start; so that the first three or four months it lives on what nitrogen it finds in the surface. If there is not such nitrogen there it will not get along very well. Therefore, the richer the land, the better result you will get to start. But you can start it, whether the land is rich or not, if you nurse it well. You will have bald spots on it. A good many of my fields have been resowed as often as four times. It takes a man of faith and persistence to grow alfalfa. If you haven't got those qualities, you had better not try it. And it will pay for the work. It will pay for the faith and the persistent effort you put into it. Plant it the latter part of April or the first of May, and it will grow up and produce a top and it will be doing fine. The last of June or the first of July the sun begins to get hot, and your alfalfa will begin to look yellow. That means that it isn't getting nitrogen enough to support the top it has. Then the thing to do is to put your mowing machine in and cut it off just as close to the ground as you can get it, so as not to cut off the crown. It will immediately grow up a new top. It is a wonderful plant in the power of growing. It is a deep, gross feeder.

Delegate—Do you leave the clippings on the ground?

Answer—If the weed crop is heavy I take them off. The first year you won't get anything. It will cost you $8.00 or $10.00 an acre if you do it right. You lose one crop. That is part of the $10.00, but you may get a pretty good crop in the latter part of the season, for alfalfa—my alfalfa—makes four crops a year. We never had less than that after the first year, and a general average of about a ton per acre on each crop. If it is thin, if it is spotted, as it is almost sure to be, unless it is on immoderately rich land, land rich in nitrogen, a place where you have fed stock, a place that you have highly manured—unless you have that sort of a plot to put it on, you will be pretty apt to find it spotted.

After the first year, every time you cut it, if it is thin, run the disc over it. You need not be afraid of killing it. Those roots go down, down, down. The next morning they begin to go on farther down. Some of the stories about the depth it grows would startle you. Mr. Coburn, in his book on that subject, writes of places where roots of alfalfa have been found over 100 feet deep. We have never dug more than three or four feet in our field, but we never found the bottom of the alfalfa root.

Now, you see how important it is to grow a plant that will feed as low down as that. After it gets started, it does not use the seven inches of surface that you want for corn, at all. It gets all its sustenance from the world below and brings it up and leaves it in storage for the seven inches, and you get a root system there the like of which is not known in any other crop. Disc and harrow and resow the bald places. That is the rule; that is all there is to it.

Delegate—How heavy do you sow that seed?

Judge Humphrey—I sow about twelve pounds to the acre. A bushel of it will sow five acres, sixty pounds to the bushel, the same as clover. It is a little bit smaller seed than clover, so that twelve pounds of alfalfa makes more plants than twelve pounds of clover seed.

Disc and resow and harrow all the places where you haven't got a stand after each cutting. That will be four times a year, and you will soon get a stand. You may get tired of buying seed, but you need not, because it responds and brings you back your money faster than any crop you can grow, including the biggest corn crop you ever saw. Four crops of alfalfa in a season are worth more dollars than any corn crop you can grow on the same land. When you grow corn for market you are hauling off the soil fertility. When you grow alfalfa you are resuscitating your land and filling it with nitrogen and at the same time making a crop worth more per acre than corn. It is the greatest nitrogen gathering plant, Professor Hopkins will tell you tomorrow, that there is. I am not going to spend any time on figures. He is the man for figures.

Delegate—How do you cure it?

Judge Humphrey—A little differently from clover. The best way to cure it after it is cut is to rake it as soon as it wilts and put it into small shocks and let it stand two, three or four days, then put it into a shed.

A Voice—Do you innoculate it when you first begin?

Answer—I beg pardon?

Delegate—Suppose you have a big rain during the time?

Answer—Yes, sometimes you will. Why, just let it rain.

A Voice—At what time of the season in southern Illinois do you cut it the first time?

Judge Humphrey (answering the first interrogatory)—I have observed this, that cattle and hogs and sheep will eat it, and eat all there is of it, in the worst possible condition that you can ever get it. Now, we are always glad to save it free from rain, but you can't always do that. If you get up one crop in a season without any rain you may count yourself lucky. You may count yourself lucky when you do that with a clover or timothy crop, don't you?

Delegate—Yes.

Judge Humphrey—Well, in four crops of alfalfa you are apt to get one, sometimes you get two, imperfect condition, and all that you get with rain on it is worth money. *No matter how long it rains*, wait until it is dry and put it into a shed, and your animals will eat it.

Delegate—Suppose you want to make it into hay, how would you handle it? Would you use the hay rotary on it?

Judge Humphrey—I never tried using it with it, but I think you could, sir, but it would be a waste, for this reason: The chief value of alfalfa is in the leaf. If you get it dry enough to put it right away in the shed, the leaves will fall off and you will lose the leaves. The object of shocking it soon after it wilts is to save the leaves. For the great virtue of the plant is in the leaf, although the stock will eat the stem also.

A Voice—Do you inoculate?

Delegate—How do you shock it?

Judge Humphrey—I rake it in the windrow. I rake it in windrows, then follow right after with a fork and shock it. Sometimes we haul it from the windrow to the shed. The boys like to do that because it saves labor, but it don't make the best hay, because you have to wait too long, if you take it from the windrow you will lose a lot of leaves. If you rake it at the proper time you can shock it and take it to the shed. You can take it to the shed from the windrow, but you will lose a lot of leaves.

Delegate—Do you put it in large shocks?

Judge Humphrey—No, I put it in prety small shocks, but it will cure in any kind of a shock.

Delegate—When do you cut it first?

Delegate—Do you inoculate?

Judge Humphrey—I inoculate. I do that because I am a pupil of Dr. Hopkins. I don't know that it won't grow without it; but I know this: I tried it three years pretty diligently, but I didn't get along with it. Since I have been following his directions I have never lost a field. But I obey orders, regardless of expense or labor.

Question—Where do you get your inoculating material?

Answer—I shipped the first ton of it at an expense of $20.00. Now I take it from the old fields.

Now, just a word about its feeding value. Alfalfa is the best possible food for horses, mules, cattle, sheep and hogs. They will leave anything else you give them to get to alfalfa. Horses will do it, cattle will do it, hogs will do it, sheep will do it. You can't give them anything else that they won't leave to get to alfalfa.

Question—In the hay form?

Answer—In the hay form. That is the only form in which we feed it. Last winter, a year ago this winter, I had eleven weanling colts. I took those colts through the winter on shelled oats and alfalfa. By the 1st of April they were all shed off and I never saw colts as fat or as fine in the winter time in my life. Generally, you know, a colt looks rough and needs shearing when it gets to the spring. But these colts were shed off and slick and nice on the 1st of April, every one of them, and fat and in the finest kind of condition. I feed it to brood sows all through the season, when they can't get any other green stuff. My opinion about hogs is, the way to be certain about hogs is to *feed them green stuff the whole year round.*

Delegate—That is correct.

Judge Humphrey—The whole year around, when there is no other green food, my hogs get alfalfa. It distends the digestive organs, makes those organs large. Hogs never get fever when eating that kind of food. When the brood sows go into the farrowing pen, about three weeks before they drop their litters, they eat alfalfa twice a day, and one ear—sometimes two ears—of corn to a big, strong sow, a day; but not much corn, mostly alfalfa, and my experience is that I get large, strong, bony, fat pigs from that treatment. They get up and go to sucking, and don't die. It is the protein that does it. It makes size; it makes strength. You want that in young animals. I don't believe there is any food on earth you can feed a colt, calf, pig or a lamb equal to alfalfa.

ITS FERTILIZING VALUE.

Now, as to its fertilizing the soil. All I know about that is what I have read and what I believe to be the fact, from looking at it, because I have never plowed any of it up yet. It is pretty hard to make up your mind to plow it after you have gone to so much trouble to get it. And see what a wonderfully valuable crop it is, too. I am going to plow a little of it this spring. They tell me it takes a very sharp plow to plow up the roots, the stem. Those roots are larger than your thumb. It comes up and grows out in great bunches, and one stalk will have one hundred tops to it; one root will develop into one hundred tops. One object in disking is to split the crowns, to start new tops, and you will get several tops instead of one; that thickens up your crop. If you want to grow alfalfa, let me tell you what to do. Get all you can out of Dr. Hopkins' lecture, then buy Mr. Coburn's book—Mr. Coburn of Kansas, of the agricultural staff of the department of Kansas—as I suppose he is the leading authority on it in this country.

Now, I will answer any questions that you may want to ask.

Delegate—When do you cut your first crop?

Judge Humphrey—The first week in June. Sometimes it will vary a little. I think I have cut it as late as the 9th of June and as early as the 2d. You say that interferes with your corn growing. Well, you might just as well have alfalfa as to have corn. I don't let anything interfere with it. I handle the alfalfa when it is necessary, just the same as I would look after my corn, but we don't have much trouble about that.

Delegate—When is the second crop ready to cut?

Judge Humphrey—Well, you follow up that way about every five weeks. Every four to six weeks it will make a crop two feet high and about a ton to the acre.

Question—Any particular variety or kind of seed—any difference?

Answer—The University Bulletin will direct you about that. I have never made any blunder about seed. I buy it in the market.

Delegate—Why do you plow it, judge?

Answer—Well, I suppose the best reason for plowing it is to get a bumper crop of corn occasionally; that I am going to plow up this spring because I am going to plant about 3,000 seedling catalpas for post timber, and I am going to plant them right through the middle of the alfalfa field and around the margins.

Question—Do you wait until the alfalfa is in bloom before you cut it?

Answer—Yes, that is the time to cut. Not when it is all in bloom; don't wait until it is all in bloom, but when it is well in bloom.

Question—The same rule as for clover?

Answer—The same rule as for clover.

Question—What are Coburn's initials?

Answer—F. D. Coburn, Topeka, Kan.

Delegate—I would like to ask a question. Two years ago I set out a very nice orchard in a feed lot, very rich. I got it in fine shape and set out an orchard. Thinks I, "Now, I will try alfalfa."

A Voice—Louder.

Delegate—I got it in good shape and I got the seed and I sowed it, and I wasn't satisfied. I took my garden rake; I think it took me pretty nearly four or five days raking that all over. I raked it over and I had it in splendid shape. It came up and grew, and I had the nicest crop of alfalfa. I just thought I was "right in it." It came time to cut it, and I went to work and cut it with my mower, raked it off, and thinks I, "Now I have got it," and the next morning it turned into rain and rained for three weeks, and my alfalfa went out of existence. [Applause.]

Question—Do you produce your own seed?

Judge Humphrey—I never have tried it. It would not pay to do it.

Question—You can do it?

Answer—Yes, you can do it, but it would not pay. Hay is worth more than the seed.

Question—How do you inoculate the soil?

Answer—I have my men go through the alfalfa field and dig up the earth all around the roots, the plants of the alfalfa. This soil will have the bacteria in it. They get a wagon bed full of it; then one rides and one stands in the back of the bed. They have a tub and they mix this all up and make it fine, so they can scatter it like seeds. One man continually sows the earth out of the back of the wagon, while the other drives. When they get that tub empty they stop and mix up another tub full. It will go on pretty fast. You don't need more than two or three hundred pounds to the acre. [Applause.]

PHOSPHORUS AND HUMUS IN RELATION TO ILLINOIS SOILS.

(By Cyril G. Hopkins.)

As a general rule, farmers are theoretical; and, as a general rule, scientific men are practical.

The great Simplon railroad tunnel recently completed between Switzerland and Italy was dug up from the two ends twelve miles apart, and under the mountain six miles from either side the two holes came together, because the work was controlled by the practical science of mathematics.

Absolute knowledge can be based only on definite facts; and mathematics, chemistry and other exact sciences furnish accurate information. But opinions based on few or many examples may be correct or incorrect.

It has been common in new countries for farmers to break the virgin sod and then to raise corn (or some other grain) continually for several years; and because the third or fourth crop was as good or better than the first or second, it was common to adopt a theory that corn growing would not exhaust the soil.

Cyril G. Hopkins.

When this theory has been disproved it has been common to adopt another theory, namely, that crop rotation with corn and oats will maintain the fertility of the soil.

Again, when this theory has been disproved, as it has been in all countries, it has been common, and still is common, to adopt the theory that, if clover be used in the rotation, the fertility of the soil will be maintained.

When the clover system fails, as it has failed always in older countries, and as it is failing now on the older lands of Illinois, it has been common for the younger men to leave the old farms, either to go farther west or to the cities. There is not much encouragement for a young man to remain on the farm when he can plainly see that the old land is less productive than the newer land, because that fact points toward future poverty. If the old land were better than the new land, then he could see future prosperity and thus be encouraged to remain on the farm.

The theory is common that lands must improve by live stock farming, but the practical facts are that land may be ruined by a poor system of live stock farming and that land may be built up and made richer than it ever was by a good system of strictly grain farming. Let us lay aside all theories and consider the facts.

The historical facts are that the practice of agriculture has reduced the productive power of soils in all extensive agricultural countries, including China, India, Russia and the eastern part of our own United States.

The industrial and commercial facts are that new agricultural countries are now furnishing large quantities of corn and wheat and animal products to support the population in the older countries.

The chemical and mathematical facts are that the common soils of the Illinois corn belt are becoming deficient in phosphorus and nitrogen, two substances without which the fertility of these soils can not be maintained.

Another fact of interest and importance is that some Illinois land owners are beginning to adopt systems of agriculture that if followed will permanently maintain the fertility of the soil and that are far more profitable in the long run than the more common ruinous practice of soil exhaustion. The following letter, received since the above was written, is a fair sample of many such letters received from land owners in the Illinois corn belt. It is dated January 16, 1908, and reads as follows:

"I own a little farm in Livingston county, thirteen miles south of the Grundy county line and thirteen miles west of the Ford county line—dark brown soil on yellow clay (subsoil); has been dogged to death with corn and oats for many years and will only in best years produce forty bushels of corn or thirty bushels of oats now.

"Land is well tiled and farmed good. I have experimented with clover and don't see much good in it, and have come to the conclusion that my land needs phosphorus more than anything else, in connection with clover and manure.

"I don't know where to get the phosphorus reasonable. It is too high on the stock yards. I take the liberty to ask you if you will kindly inform me where I can get it. Yours very respectfully,

[Signed] "J. W. Klyver."

Regarding Phosphorus.

Phosphorus is a chemical element which is essential to the growth and structure of every plant and animal. The absolute requirements of different crops for the element phosphorus are well known within narrow limits. Thus, a hundred bushel crop of corn requires about twenty-three pounds of phosphorus, seventeen pounds for the grain and six pounds for the stalks; a fifty bushel crop of wheat requires about sixteen pounds of phosphorus, twelve pounds for the grain and four pounds for the straw; and a four ton crop of clover, including perhaps three tons in the hay crop and one ton in the seed crop, requires twenty pounds of phosphorus, or more than is contained in 100 bushels of corn.

To produce such crops during the full time of one life (three score years and ten) would require as much phosphorus as the total supply contained in the first seven inches of the most common Illinois prairie soil, and to have produced such crops from the time Columbus discovered America until the present year would have required every pound of phosphorus contained in these soils to a depth of four feet.

These are not theories or mere opinions; they are mathematical and chemical facts. If animals must have bone and brain, they must have phosphorus; for without phosphorus neither bone nor brain exists, and the phosphorus requirements of the plant are no less absolute than for the animal.

Phosphorus is sold from the farm largely in grain, in bone and in hay. The phosphorus removed from the soil in the average corn crop of Illinois (grain only) is equal to the total phosphorus contained in 50,000 acres of our corn belt land to a depth of seven inches, and a larger amount is removed in the aggregate of other crops.

If the total annual progress toward land ruin in this State were to be concentrated on the complete ruin of 100,000 acres each year it would awaken an active interest in every land owner, but because the effect is only gradual and widespread many people ignore it so long as possible.

To return the phosphorus annually removed from the soil in the corn crop of Illinois would require all of the manure that could be made by feeding 500 million bushels of corn, or 150 million bushels more than we raise; or it would require the application of a quarter million tons of natural rock phosphate at a cost of two million dollars, or it would require the application of at least twenty million dollars' worth of ordinary so-called complete commercial fertilizer.

To supply to ten acres of land sufficient phosphorus for a hundred bushel crop of corn per acre for one year would require the manure that could be made from 2,000 bushels of corn, costing $800.00 for feed. The same quantity of phosphorus (250 pounds) can be purchased in one ton of rock phosphate for about $8.00, in one ton of steamed bone meal for $25.00, in two tons of acid phosphate for about $30.00, or in four tons of complete fertilizer costing from $80.00 to $100.00.

A few people feed all of the crops raised on their own farms and also purchase additional supplies of phosphorus in corn from their Illinois neighbors, in wheat bran from their Minnesota neighbors, in oil meal from their Dakota neighbors, or in cotton seed meal from their Mississippi neighbors, because they have the ability and equipment for stock feeding, and they may make some profit on the feed purchased and thus without extra expense secure for their own farms some phosphorus taken from their neighbors' farms.

But this practice only permits that one farm shall be enriched while several other farms are being impoverished. No great agricultural State like Illinois can thus permanently maintain the fertility of the soil and continue to sell grain or bone from the farms.

The most practical and economical method of maintaining the supply of phosphorus in the soil is by the application of 1,000 pounds to the acre of fine ground natural rock phosphate once every four to six years, in connection with liberal supplies of decaying organic matter, as farm manure, legume crops or other green manures.

In order to increase the total phosphorus content of the soil, so as to have a larger working capital than the present stock, it is advisable that once during the rotation one ton or more per acre shall be applied for the first three or four crop rotations, thus increasing the supply within a few years from 1,200 pounds, the present average, to about 2,000 pounds of phosphorus per acre, after which the smaller application of one-half ton of rock phosphate per acre once every five or six years will at least permanently maintain or continue slightly to increase the supply of phosphorus in the soil.

It is worth while for land owners to bear in mind that at $8.00 a ton for 12½ per cent of rock phosphate, more phosphorus can be purchased for $40.00 than is now contained in an acre of our most common $150.00 prairie land to a depth of seven inches, and if the productive capacity of the land is to be maintained the fertility of the surface soil must be maintained, for even a rich subsoil has but little value if it lies beneath a worn out surface.

Regarding Humus.

Before discussing the results already obtained from the use of rock phosphate in Illinois and other states, let us consider briefly the subject of humus.

By humus is meant the decaying organic matter of the soil formed largely from plant roots and crop residues and from applications of farm manure. The most important constituent of humus is nitrogen. This element of plant food is contained not in the mineral part of the soil, not in silt or sand or clay, but only in the organic matter.

Nitrogen is required by all crops in very considerable amounts—in much larger amounts, in fact, than phosphorus. While the supply of nitrogen in our common soils is large compared with the supply of phosphorus, nevertheless it is small compared with the requirements of large crops year after year.

Thus, to produce a hundred bushel crop of corn every year for thirty-two years would require as much nitrogen as is contained in the first seven inches of our ordinary corn belt prairie land, assuming that the stalks are either burned or harvested and removed with the grain. If only the ear corn is removed and the stalks are returned to the soil, the nitrogen in the first seven inches is sufficient for forty-eight such crops. The total supply of nitrogen now present in our most common prairie soil to a depth of forty inches is no greater than would be required for ninety-five such crops of corn if the stalks were burned or removed with the grain.

Small amounts of nitrogen are added to the soil in the rainwater, and certain bacteria, as the azotobacter, have some power to fix atmospheric nitrogen in the soil, even though they do not live in the root tubercles of legume plants, but the annual losses in drainage waters exceed these added supplies, so that we dare not do less than to make ample provision for the crops to be grown by additions of humus, either in farm manure or in legume crops or green manures.

A few fundamental facts will serve as a guide in this matter:

One ton of clover hay contains about forty pounds of nitrogen, and the clover roots contain not more than one-half as much nitrogen as is contained in the tops. Thus, two and one-half tons of clover hay must be returned to the soil to furnish the 100 pounds of nitrogen required for 100 bushels of corn (grain only), and nearly as much is required to furnish the ninety-seven pounds of nitrogen for a 100 bushel crop of oats, grain or straw.

Soils that will furnish nitrogen for large crops of corn and oats will also furnish some of the nitrogen for the clover crop, certainly as much as is left in the clover roots and stubble after both hay and seed crops are removed. Consequently, if we are to enrich the soil in nitrogen by growing clover, the clover must be returned to the soil, either by plowing under directly or in the form of manure from pasturing or feeding.

It should be clearly understood that for fertilizing purposes a ton of clover hay is worth very much more than the manure resulting when the clover is fed to animals. As a general average, about one-fourth of the nitrogen and phosphorus contained in the feed is retained by the animals and three-fourths are returned in the solid and liquid manure, while about two-thirds of the total organic matter contained in mixed feeds are digested by the animals and only one-third returned to the solid manure. Thus, a ton of dry feed containing forty pounds of nitrogen and four pounds of phosphorus would furnish a quantity of manure containing about 700 pounds of dry matter, thirty pounds of nitrogen and three pounds of phosphorus.

If the feeding is done on the field or pasture all of the liquid and solid excrement is returned to the soil, but under the best conditions of ordinary feeding more or less of the nitrogen is lost in the liquid manure, unless cement floors are provided or very liberal amounts of absorbent bedding are used. The Ohio Experiment Station has recently conducted an investigation with fifty-eight steers, covering a feeding period of six months. Of these steers, twenty-eight were fed on a cement floor and 25.3 per cent of the nitrogen in the feed was not recovered in the manure; while thirty steers were fed on an earth floor and 37.6 per cent of the nitrogen was not recovered. In one case the animals retained 22.5 per cent of the phosphorus and in the other 21.1 per cent.

It is safe to say that of the feed hauled off from the field not more than one-fourth of the dry matter and one-half of the plant food elements will be returned to the field in the manure under conditions likely to be considered practicable; and if the manure is left exposed to the weather for three to six months, even these proportions should be divided by two.

The supply of humus and nitrogen in the soil can be maintained or even increased either by a good system of live stock farming or by strictly grain farming. We will discuss briefly two such systems.

GRAIN FARMING.

For a system of grain farming let us consider, for example, a three-year rotation of corn, oats, and clover. Let us assume that the yields are 100 bushels of corn and oats, 4 tons of clover and 4 bushels of clover seed. We may sow cowpeas in the corn at the last cultivation and possibly produce a catch crop of half a ton to the acre, but this needs further investigation.

We will plan to harvest the ear corn and leave the stalks on the land to be disked down in preparing the land for seeding oats and clover. The oats should be cut as high as possible and the threshed oat straw should be spread over the land either before or after rotting as may be found best. The third year the clover may be clipped perhaps two weeks before haying and left lying on the land, the second crop being harvested later for seed, using a buncher attached to the mower so as to avoid raking. The threshed clover straw should be spread over the land, and if rock phosphate is used it may be applied and plowed under with all of the accumulated organic matter in preparation for the following corn crop which would thus begin the second rotation.

The 100 bushels of corn, 100 bushels of oats, and 4 bushels of clover seed remove about 173 pounds of nitrogen, while on the basis above described the four tons of clover and one-half ton of cowpeas return to the soil about 182 pounds of nitrogen, and, together with the corn stalks and oat straw, furnish large supplies of humus.

This is given as a single example of a system of grain farming planned to maintain the supply of humus and nitrogen in the soil. The yields may be cut in two if you choose, but the basis of the system still remains.

I cannot advise Illinois farmers to raise 50 bushels of corn because we have harvested 96 bushels per acre as a three-year average. I do not suggest 50-bushel crops of oats because we have harvested over 90 bushels and I know an 18-acre field that produced 1800 bushels of oats. I do not try 2 bushels of clover seed because I have seen a 50-acre field treated as above described that produced 5¼ bushels of clover seed per acre.

Let us plan to raise large crops, limited not by the soil, but only by the sunshine and rainfall. Let us have a high ideal, even though we may not reach it.

Many other rotations for grain farming might be used, and other legume crops and catch crops, of which the common rank-growing sweet clover promises to be one of the most useful; but in all cases liberal use must be made of legume crops and catch crops and other green manure crops and crop residues in order to supply humus and nitrogen. If necessary the rotation may be extended and one year devoted entirely to green manuring, as is sometimes done in older countries.

LIVE STOCK FARMING.

For a system of live stock farming we may practice a five-year rotation including corn for two years, oats with clover and timothy seeding the third year, and two years clover and timothy, using one year for hay and the other for pasture, assuming 100-bushel yields of corn and oats and 4-ton crops of hay or of air-dry feed from pasture, counting the hay as three-fourths clover and the pasture as three-fourths timothy.

One-half of the corn we may harvest for shock corn or ensilage, and the other half as ear corn, and the oat straw will be used for feed and bedding.

The four crops harvested will remove from the soil about 369 pounds of nitrogen and the clover hay will contain about 120 pounds of nitrogen which we assume was secured from the air, thus making 489 pounds of nitrogen in the total feed and bedding. If one-half of this is recovered in the manure and returned to the land, there would be a deficiency of 124 pounds; while if two-thirds of the nitrogen can be recovered in the manure, which is possible under the best conditions with cement feeding floors or very liberal use of straw and shredded fodder for bedding, the deficiency is reduced to 43 pounds. If the pasture is one-fourth clover and three-fourths timothy, and if three-fourths of the nitrogen in the pasture feed is returned in the excrements, there would be a gain of 12 pounds of nitrogen from the pasturing, which would reduce the deficiency to 31 pounds per acre at the end of the five years.

By feeding more or less upon the fields and by leaving considerable clover in the pasture to serve as green manure, this small deficiency can be replaced by some excess of nitrogen; but to maintain or to increase the supply of humus and nitrogen in the soil is by no means an easy problem, even with live stock farming.

For the most common upland timber and prairie soils of the Illinois corn belt, keep in mind these two words, phosphorus and humus. Whoever farms these soils in a way to increase both phosphorus and humus will have his farm growing richer and richer and more and more productive, and ultimately his old land will be better than new land; but whoever removes the phosphorus or destroys the humus more rapidly than they are replaced will have poorer land year by year, with poverty as the only future for the children who continue the same ruinous system. Not phosphorus alone, and not humus alone, for it is impossible to produce it without phosphorus—but both phosphorus and humus must be supplied.

THE USE OF ROCK PHOSPHATE.

In considering the use of fine-ground natural rock phosphate, it should be distinctly understood that repeated experiments have shown that this material gives practically no immediate returns if used in the absence of decaying organic matter. On the other hand, when used in intimate connection with liberal amounts of farm manure, clover or other green manures, rock phosphate is the most economical and profitable form of phosphorus to use where the crop returns for a series of years are taken into account.

But let us remember this fact, that corn does not live on phosphorus alone, and, no matter how large the amount of phosphorus applied, the productive power of the soil cannot be maintained without humus, and it is equally true that without phosphorus we cannot produce the clover or other crops from which to supply the humus.

If rock phosphate is applied to the soil without manure or clover or other organic matter, it is not lost, but it remains in the soil until the organic matter is provided, which, by its fermentation and decay, has power to dissolve the phosphate, and thus render the phosphorus available as plant food. Call to mind the condition of a bolt or iron rod or steel pitch fork that has been buried in the manure pile for six months, and it will help you to appreciate the power of rotting organic matter to dissolve rock phosphate or other mineral substances. Even with but little decaying organic matter the clover plant has some power to utilize the rock phosphate, if it has become thoroughly mixed with the plowed soil.

In discussing the use of rock phosphate, a brief statement is appropriate regarding the manufacture of acid phosphate and of so-called complete commercial fertilizers.

One ton of fine-ground natural rock phosphate, containing about 250 pounds of the element phosphorus, and costing about $8.00 delivered in bulk in carload lots in central Illinois—I say one ton of this material is mixed with one ton of sulfuric acid to make two tons of acid phosphate which can be bought for about $15.00 a ton, or $30.00 for the two tons of acid phosphate containing the same amount of phosphorus and no more than was contained in the one ton of the natural rock. In other words, the 250 pounds of phosphorus that cost $8.00 in one ton of the natural rock will cost $30.00 in two tons of the manufactured acid phosphate.

The so-called complete fertilizers are commonly made by mixing the two tons of acid phosphate with two tons of filler containing small amounts of nitrogen and potassium; and this is the fertilizer most commonly sold in the eastern and southern states at about $20.00 a ton, or $8.00 for the four tons of complete fertilizer containing the same amount of phosphorus and no more than the one ton of natural rock phosphorus costing $8.00.

The most popular filler at the present time is the decayed peat from such bogs as are common in Tazewell and Mason counties, and for several years a large plant has been in operation near Manito where the decayed peat is dried and ground and shipped to various fertilizer factories. The peat has such a low fertility value that it is not profitable for farmers to haul it from the bogs and spread it on the land, at no cost whatever except for the labor.

A ton of such complete fertilizer costing at least $20.00 and sometimes sold even in Illinois for $25.00 to $27.00 a ton, actually contains about $2.00 worth of phosphorus (based on its cost in natural rock); it contains no more potassium than a ton of ordinary soil, and only half as much nitrogen as a ton of dried peat soil. In addition it contains the equivalent of 500 pounds of sulfuric acid in a form to increase the acidity of the soil.

The nitrogen from peat in such a fertilizer is not only nearly inert and almost valueless, but even available nitrogen cannot be purchased for use in general farming in Illinois except at a loss, whereas in the atmosphere above every acre of land is sufficient nitrogen for 100 bushels of corn every year for 700,000 years, and by means of the root-tubercle bacteria of clover, alfalfa, sweet clover, cowpeas, soybeans, and other legume crops, the free nitrogen of the air can be fixed in these plants and stored in the soil either by plowing under the crop or by feeding it and returning the manure.

So far as the amount of potassium is concerned the so-called 2-8-2 fertilizer contains no more than the soil itself. In other words, a ton of the soil spread back over itself would add as much potassium as a ton of the fertilizer. The only difference is that the potassium in the fertilizer may be more readily available. On the other hand, sufficient decaying organic matter will make available from our soils enough potassium to meet the needs of the largest crop, and the supply of potassium in the first seven inches is sufficient for 100 bushels of corn every year for 1790 years as an average of the common corn belt prairie soil.

For thirteen years the Ohio Experiment Station has conducted experiments at Wooster with nitrogen, phosphorus, and potassium, all in available form, singly and in combinations. As an average of 13 crops of corn at 35 cents a bushel, 13 crops of oats at 25 cents a bushel, 13 crops of wheat at 70 cents a bushel, 10 crops of clover with some timothy and 10 crops of timothy with some clover, at $6.00 a ton for hay, all grown in this five-year rotation on five different fields, so that every crop could be represented every year—I say as an average of all these tests on land that is richer in phosphorus than our land, but poorer in nitrogen than our land, every dollar invested in phosphorus has paid back $4.76, while neither nitrogen nor potassium has paid for its cost; and yet the complete fertilizer containing all three of these elements has been used with some profit, merely because the loss on nitrogen and potassium was not so large as the profit on the phosphorus.

In a similar series of long continued and very carefully conducted experiments at Strongsville, Ohio, the profit on phosphorus has been greater, and the losses on nitrogen and potassium have also been greater than at Wooster. Neither alone nor together nor in any combination has the use of nitrogen or potassium paid the cost on either field, as an average of all the years in the test.

It is true that larger crops have been grown with some of the combinations than with phosphorus alone, but this is detrimental rather than beneficial, because the increase thus secured not only cost more than it came to, but the larger crops removed from the soil twice as much phosphorus as was applied, as well as more of the other elements than was applied, so that this soil must grow poorer ultimately under this system, in harmony with the common experience where ordinary commercial fertilizers have thus been used. The question is not always, how large crops can we raise, but how large can we afford to raise and what is the effect on the soil?

TABLE 1.

Experiments with Soluble Fertilizers at Wooster, Ohio.

Plant food applied.	Corn, 13-year average bushels.	Oats. 13-year average bushels.	Wheat, 13-year average bushels.	Clover, 10-year average tons.	Timothy 10-year average tons.
Nitrogen, 75 lb	4.39	4.39	1.87	.148	.166
Phosphorus, 20 lb	7.69	8.12	7.62	.165	.063
Potassium, 108 lb	4.10	3.27	1.27	.038	.077
Nitrogen, phosphorus	13.94	15.30	12.73	.441	.326
Nitrogen, potassium	5.17	4.80	2.61	.177	.182
Phosphorus potassium	13.02	11.45	8.89	.278	.195
Nitrogen, phosphorus, potassium	17.23	19.28	15.98	.539	.445
Nitrogen (1½),* phosphorus, potassium	17.24	18.42	17.18	.500	.363
Total yield from untreated land	(30.98)	(31.57)	(9.55)	(.83)	(1.22)

Financial Statement.

Plant food applied.	Cost of fertilizer in five years.	Total value of increase in 5 crops.	Profit from fertilizer in 5 years.
Nitrogen, 75 lb	$12.00	$ 5.83	($6.17) loss
Phosphorus, 20 lb	2.40	11.42	9.02
Potassium, 108 lb	6.50	3.83	(2.67) loss
Nitrogen, phosphorus	$14.40	$22.22	$ 7.82
Nitrogen, potassium	18.50	6.99	(11.51) loss
Phosphorus, potassium	8.90	16.48	7.58
Nitrogen, phosphorus, potassium	$20.00	$27.94	$7.04
Nitrogen, (1½),* phosphorus, potassium	26.90	28.38	1.48
Value of 5 crops from untreated land	None	(37.72)	....

*112½ lbs. of nitrogen on this plot; otherwise the applications were nitrogen, 75 lb., phosphorus, 20 lb., and potassium, 108 lb. per acre in five years.

The prices for farm produce mentioned above represent approximately our ten-year average, and they are certainly as high as we can safely use for Illinois conditions, remembering that the increase in the crops increases the thresh bill and also to some extent the cost of harvesting and marketing, especially for hay.

TABLE 2—*Experiments with Soluble Fertilizers at Strongsville, Ohio.*

Plant food applied.	Corn, 12-year average bushels.	Oats, 11-year average bushels.	Wheat, 10-year average bushels.	Clover, 10-year average tons.	Timothy 10-year average tons.
Nitrogen, 75 lb	1.18	−.05	−.24	.08	.01
Phosphorus, 20 lb	9.51	10.09	7.14	.45	.16
Potassium, 108 lb	.20	.41	−.15	.05	−.01
Nitrogen, phosphorus	10.46	14.38	9.72	.39	.13
Nitrogen, potassium	1.40	2.24	1.67	.06	−.02
Phosphorus, potassium	9.04	10.54	8.04	.34	.17
Nitrogen, phosphorus, potassiun	12.07	14.69	10.21	.39	.17
Nitrogen, (1½),* phosphorus, potassium	11.86	14.51	12.85	.36	.11
Total yield from untreated land	(26.94)	(34.80)	(5.62)	(.68)	(.75)

Financial Statement.

Plant food applied.	Cost of fertilizer in five years.	Total value of increase in 5 years.	Profit from fertilizer in 5 years.
Nitrogen, 75 lb	$12.00	$ .77	($11.23) loss
Phosphorus, 20 lb	2.40	14.51	12.11
Potassium, 108 lb	6.50	.31	(6.19) loss
Nitrogen, phosphorus	$14.40	$17.18	$ 2.78
Nitrogen, potassium	18.50	2.46	(16.04) loss
Phosphorus, potassium	8.90	14.49	5.59
Nitrogen, phosphorus, potassium	$20.90	$18.40	($2.50) loss
Nitrogen, (1½),* phosphorus, potassium	26.90	19.42	(7.48) loss
Value of 5 crops from untreated land	None	(30.64)	....

*112½ lb. nitrogen on this plot; otherwise the applications were nitrogen, 75 lbs., phosphorus, 20 lb., and potassium, 108 lb. per acre in 5 years.

The prices used by the Ohio station, including $2.00 a ton for straw and $3.00 a ton for corn stover, average more than 30 per cent higher than the prices we allow ourselves to use in Illinois; but even at the Ohio prices, when, for the second rotation period of five years, nitrogen shows some profit at Wooster, when used in addition to phosphorus, the profit from phosphorus alone is more than twelve times as great, for every dollar invested, and postassium made a much poorer showing even than nitrogen, a dollar invested in phosphorus having paid more than twenty-eight times as much as when invested in potassium. On the Strongsville field, even at the Ohio prices for farm produce, neither nitrogen or potassium paid the cost, neither alone nor in any combination.

From every view point except that of the short sighted fertilizer agent the only conclusion to be drawn from these Ohio experiments is that if we have money to invest in plant food for use on such soils, we should purchase only the element phosphorus, the nitrogen to be secured from the inexhaustible supply in the air and the potassium to be liberated from the immense supply in the soil.

In tables 1 and 2 are given in detail the results of these valuable investigations conducted at Wooster and Strongsville under the direction of Professor Charles E. Thorne, a man whose work with field experiments easily takes the first rank in America.

With these investigations with soluble, or so-called available, forms of plant food, showing large profit from phosphorus and considerable loss from the use of commercial nitrogen and potassium, are of great interest and benefit, of still greater practical value to Illinois, are the Ohio experiments with fine ground natural rock phosphate, used in conection with manure in a three-year rotation of corn, wheat and clover; and I am glad to state here that the Illinois Experiment Station and the farmers of this State are under obligations to Director Thorne and the Ohio Experiment Station, because I have been furnished all of the results of these investigations, including the year 1907, for presentation at this Illinois State Farmers' Institute.

Eleven years ago the Ohio station began a duplicate experiment to determine whether fine ground natural rock phosphate would be made available if applied to the soil and plowed under in intimate contact with decaying organic matter, by mixing forty pounds of rock phosphate with each ton of manure and applying eight tons of manure per acre and by comparing the crop yields from this land with those from similar adjoining land to which the same kind and amount of manure was applied without the phosphate.

In 1897 the experiment was begun with corn, and in 1898 this corn was followed by wheat without further manuring, but on another part of the field the same treatment was again applied for corn, and in 1890 a third part of the field was treated and planted in corn, while wheat followed the 1898 corn, and clover should have been grown on the field first started, thus making it possible thereafter to have every crop in the rotation growing every year; and by duplicating the experiment, using two kinds of manure, there were six tests every year after the experiment was well under way.

Of course there was no wheat crop for the first year and no clover for the first two years, and the clover failed even the third and fourth years, but with these exceptions there have been six tests every year, or fifty-six separate tests during the eleven years.

TABLE 3—*Increase from 320 Pounds of Rock Phosphate and 8 Tons of Manure over 8 Tons of Manure Alone in the Three-Year Rotation.*

Time.	Number of tests.	Corn at 35 cts. bushel.	Wheat at 70 cts. bushel	Clover at $6.00 ton.	Total value.
First year (1897)	2	$1 72	....	....	$1.72
Second year (1898)	4	70	$2 45	....	1 75
Third year (1899)	4	1 79	2 45	*	4 24
Fourth year (1900)	4	1 23	7 21	*	8 44
Fifth year (1901)	6	1 86	3 50	3 06	8 42
Sixth year (1902)	6	3 68	1 75	3 79	9 22
Seventh year (1903)	6	4 12	4 97	2 83	11 92
Eighth year (1904)	6	77	2 52	4 90	8 19
Ninth year (1905)	6	3 19	4 48	2 18	9 85
Tenth year (1906)	6	4 78	5 46	2 75	12 99
Eleventh year (1907)	6	1 71	14	1 40**	3 25
Total for 11 years	56	$24 15	$34 93	$20 91	$79 99
Cost of phosphorus	56	14 08	0 00	0 00	14 08
Profit in 11 years	56	$10 07	$34 93	$20 91	$65 91

Average of 56 food tests. $1.00 in rock phosphate paid back, $5.68.
Average of 56 similar tests, $1.00 in acid phosphate paid back, $4.07.
*Clover failed; soy beans grown and plowed under. **Soybean hay; clover failed.

The value of the increase produced with rock phosphate and manure above that produced with manure alone is shown in table 3 for each of the three crops, also the total increase for the three crops.

It will be observed, that the effect of the phosphate is very slight in certain cases; and in 1898 the average yield of corn was two bushels less where phosphate was added with the manure than where manure alone was used, and in 1907 the gain on the wheat crop amounted to only 14 cents in value. Even these results are important because they emphasize the fact that when one man makes a single trial in a single year with a single crop and guesses that the crop is either better or poorer than on the untreated land, his opinion has very little value, notwithstanding the fact that his own experiment, without scales or measurements, may have greater influence upon his mind either for or against the system than even eleven years of the most carefully conducted experiments.

At $8.00 a ton the cost per acre in these Ohio experiments was $1.28 for the rock phosphate, applied only once in three years on any one field, but applied to a different field every year. Thus the total cost of the rock phosphate for three acres of land for eleven years amounts to $14.08, while the value of the increase in the crops produced by the phosphate during that time amounts to $79.90, or $5.68 return for every dollar invested in the rock phosphate.

Let this fact be repeated: As an average of 56 separate tests, covering 11 years with three different kinds of crops and two kinds of manure on land that is not so poor in phosphorus as the common worn prairie land in Illinois, every dollar invested in fine-ground natural rock phosphate has already paid back $5.68, with corn at 35 cents a bushel, wheat at 70 cents a bushel, and clover hay at $6.00 a ton, and with one wheat crop and four hay crops lacking during the 11 years.

Furthermore, in 56 other entirely similar tests conducted on the same kind of land during the same time, where acid phosphorus was used instead of natural rock phosphate, every dollar invested in the acid phosphate paid back $4.07.

In addition to this we have the results of the fertilizer experiments previously described with the five-year rotation on the same kind of soil at Wooster, where as an average of 59 tests covering 13 years every dollar invested in acid phosphate paid back $4.76.

TABLE 4—*Value of Manure and Rock Phosphate.*

(Average increase in crop yields in Ohio experiments.)

Manure and Treatment per Acre. (Applied to clover sod and plowed under for corn.)	Corn, 11-year, average bushels.	Wheat, 10-year, average bushels.	Hay, 7-year average bushels.	Increase in manure* tons.
Yard manure, 8 tons per acre	16.8	8.5	.33	2.00
Stall manure, 8 tons per acre	23.1	9.9	.60	2.82
Stall manure, 8 tons, and rock phosphate, 320 lb	29.4	15.2	1.16	4.21
Total yield on untreated land	(34.6)	(10.4)	(1.02)	(4.20)

Financial Statement.

Manure and Treatment.	Value of increase in 3 crops.	Cost of phosphorus.	Increase from phosphorus.	Increase from $1.00 invested.
Yard manure, 8 tons	$13 75	....	....	....
Stall manure, 8 tons	18 62	....	....	....
Stall manure and rock phosphate	27 89	$1 28	$9 27	$7 24
From untreated land	(25 48)	....	....	....

Value of 8 tons yard manure 3 to 5 months old	$13 75
Value of 12 tons fresh stall manure requred for same	27 93
Value of 12 tons stall manure phosphated (net)	39 92

*Assuming that two-thirds of the crops produced are used for feed and bedding and that one-fifth of the manure produced will be lost. The untreated land would thus furnish 4.20 tons of manure.

Before leaving these Ohio experiments I desire to call attention to Table 4, in which is reported in detail the effect of yard manure, of stall manure, and of stall manure with rock phosphate, upon the average yield of corn, wheat, and clover. The results reported are not the total yields but only the increase produced by the different treatments, except in case of the untreated land, where the total yield is given.

As an average of 11 crops of corn, 10 crops of wheat, and 7 crops of hay, it will be observed that 8 tons of yard manure produced increased yields worth $13.75. On the same basis 8 tons of stall manure were worth $18.62, while 8 tons of stall manure to which $1.28 worth of rock phosphate was added were worth $27.89. In other words, the phosphated stall manure is worth more than twice as much as the yard manure, and one dollar invested in rock phosphate has paid back $7.24 when used in connection with manure that has been properly cared for. Even this comparison does not do justice to the stall manure, because to produce 8 tons of yard manure 3 to 5 months old requires about 12 tons of fresh stall manure at the beginning. In other words, if twelve tons of fresh stall manure are exposed in the open yard for 4 months, not more than 8 tons of yard manure will be left at the end of that time under average spring or summer conditions.

Thus, it is fair to say that 12 tons of stall manure after 4 months exposure are reduced to 8 tons of yard manure worth $13.75, while 12 tons of fresh stall manure are worth $27.93; and 12 tons of phosphated stall manure are worth $41.84 gross, or $39.92 if we deduct the cost of the rock phosphate.

It should also be mentioned that if 4.20 tons of manure could be made from the produce of the untreated land, then 6.20 tons could be made from the yard manure plots and 7.02 tons from the stall manure plots, while the products from the land treated with stall manure and rock phosphate would furnish 8.41 tons of manure to be returned, or slightly more than was opplied.

While the same amount of manure has been applied regularly to these different plots, it is plain to see that, in full justice to the treatment, the manure should be returned in proportion to the crop yields secured during the previous rotation, because the amount of manure possible is in direct proportion to the previous crop yields.

In the soil experiments in progress in various parts of Illinois the plan adopted where manure is used is to apply the manure in proportion to the crop yields of the preceeding rotation.

In Table 5 are given the yields of air-dry clover hay from three different series of plots on the Uuiversity of Illinois soil experiment fields at Urbana, during the last three years. The one striking result is that phosphorus has doubled the yield of clover as an average of the three years.

On the Bloomington soil experiment field in McLean County, referred to in the lower part of Table 5, phosphorus increased the yield of wheat by 10 bushels per acre in 1905, increased the yield of clover by more than one ton per acre in 1906, and increased the yield of corn following clover by 19 bushels per acre in 1907. The increase in either crop would practically pay the cost of phosphorus applied for three years.

TABLE 5—*Clover Yields from Illinois Corn Belt Prairie Soil.*

(Urbana Soil Experiment Field.)

Special Soil Treatment.	Clover 1905, tons.	Clover 1906, tons.	Clover 1907, tons.
None	.81	.76	.62
Lime	.87	.96	.61
Lime, phosphorus	1.83	1.71	1.48
Lime, phosphorus, potassium	2.00	1.75	1.62

Bloomington Soil Experiment Field.

Special Soil Treatment.	Wheat, 1905, bushels.	Clover 1906, tons.	Corn 1907, bushels.
None	31	.39	61
Lime	29	.58	63
Lime, phosphorus	39	1.65	82
Lime, phosphorus, potassium	38	2.36	81

On both of these fields, the phosphorus has been applied in steamed bone meal during the past six years.

Experiments with the use of natural rock phosphate were started more recently in Illinois, but, if rotting organic matter will make rock phosphate available in Ohio, it will do the same thing in Illinois. It may be said, however, that the Illinois soil investigations have shown not only that phosphorus is becoming deficient in our common soils, as established by chemical analysis, and not only that the use of phosphorus in steamed bone meal produces marked and profitable increase in crop yields, but also that fine-ground natural rock phosphate gives good results on our soils, certainly as good as we could reasonably expect under the conditions and during the first few years.

In Table 6 are reported in detail the results of 4 years, experiments with rock phosphate applied at the rate of one ton per acre on the South Farm experiment field at Urbana.

A four year rotation of corn, oats, wheat, and clover is practiced on four series of plots, so that every crop may be represented every year. This has been the case during the past four years except for the clover crop in the first year. There are four different tests with every crop every year, so that this experiment includes 16 tests with each of the grain crops and 12 tests with the clover crop.

From the last column it will be seen that as an average of all crops grown during the four years the increase produced by the rock phosphate has been worth $7.95, while the 250 pounds of phosphorus applied cost $8.00 and 210 pounds of it still remain in the soil.

TABLE 6—*Rock Phosphate on Urbana Experiment Field.*

(Typical Illinois corn belt prairie soil.)

Crops.	No. of tests.	Average yield.		Increase.	Value of increase.
		Without phosphorus.	With phosphorus		
Corn	16	64.6 bu.	66.9 bu.	2.3 bu.	$ 81
Oats	16	40.0 bu.	44.5 bu.	4.5 bu.	1 13
Wheat	16	26.9 bu.	31.8 bu.	4.9 bu.	3 43
Clover	12	1.19 T.	1.62 T.	.43 T.	2 58

Value (250 — 40)= 210 lbs. phosphorus and $7 95

Results for 1907 Only.

Corn	4	64.5 bu.	70.0 bu.	5.5 bu.	$1 93
Oats	4	33.0 bu.	4.7 bu.	1.7 bu.	43
Wheat	4	40.3 bu.	42.9 bu.	2.6 bu.	1 82
Clover	4	1.39 T.	2.64 T.	1.25 T.	7 50

Value (250—49)=201 lb. phosphorus and $11.68

Cost of 250 lb. phosphorus in one ton of rock phosphate.............. 8.00

Phosphorus in soil at end of 4 years....................160 lb. or 1401 lb.

If we consider the results of 1907 only, it will be seen that the increase in the four crops is worth $11.68, or $3.68 more than the cost of the phosphorus, and more than four-fifths of the phosphorus applied still remains in the soil. In other words, the treated soil has furnished 49 pounds of phosphorus to the crops grown but still has 1401 pounds in the plowed soil, or 201 pounds more than at the beginning, while the untreated soil is poorer than at the beginning by 40 pounds of phosphorus, which, if it all came from the surface soil, would reduce the phosphorus in the first 7 inches from 1200 to 1160 pounds per acre. Of course some phosphorus will come from the subsoil so long as the surface soil is rich enough to grow crops.

In Table 7, are reported results obtained from the Galesburg soil experiment field in Knox County, which, like the Urbana and Bloomington fields, is located on the ordinary or most common Illinois prairie land.

TABLE 7—*Rock Phosphate on Galesburg Experiment Field.*

(Typical Illinois corn belt prairie soil.)

Crops.	No. of tests.	Average yield.		Increase.	Value of increase
		Without phosphorus.	With phosphorus.		
1st year corn	8	69.8 bu.	75.3 bu.	5.5 bu.	$1 93
2nd year corn	8	64.8 bu.	74.1 bu.	9.3 bu.	3 26
Oats	4	50.7 bu.	54.3 bu.	3.6 bu.	$ 90
Wheat	4	35.2 bu.	40.3 bu.	5.1 bu.	3 57
1st year hay	4	.76 T.	1.02 T.	.26 T.	$1 56
2nd year hay	4	1.36 T.	1.89 T.	.53 T.	3 18

Value (375 — 68) = 307 lb. phosphorus and $14 40
Cost of 375 lb. phosphorus in 1½ tons of rock phosphate 12 00
Phosphorus in soil at end of 6 years .... 1144 lb. or 1507 lb.

A six-year rotation is underway, consisting of corn for two years, followed by oats and wheat, and then by two years of clover and timothy. There are three independent series of plots, so that every year corn is grownig on one series, oats or wheat on another series, and clover and timothy on the other. The land was in timothy sod at the beginning.

An initial application of 1½ tons per acre of rock phosphate was applied to certain plots in each series, and this application will be repeated each rotation until the total phosphorus content of the plowed soil is increased to about 2000 pounds, after which the applications will probably be reduced so as to supply only as much phosphorus as is removed in the crops grown.

Of course the results thus far secured are very preliminary and show but little of what it is reasonable to expect from the system when fully under way after the benefit of one or two full rotations is felt; but the data reported in Table 7 are a trustworthy indication of the progress being made.

The value of the increase from the six crops amounts to $14.40, or $2.40 more than the cost of the rock phosphate applied. Furthermore, of the 375 pounds of phosphorus added, only 68 pounds have been removed in the larger crops from the treated land, so that the net results has been to increase the total supply of phosphorus in the surface soil from 1200 pounds to 1507 pounds, while on the untreated land the original supply has been decreased by 56 pounds per acre.

On four different soil experiment fields, in the counties of Knox, Ogle, Winnebago, and Lake, as an average of 32 different tests, in 1906 and 1907, rock phosphate increased the yield of air-dry hay by .55 ton, and this was done without adequate supplies of decaying organic matter, but where the phosphate had been applied two years before and was well mixed with the soil.

While more than half a ton of air-dry hay will pay for the annual cost of the phosphate applied and leave 40 per cent profit, much better results are certain to follow when the clover or other decaying organic matter is returned, not only to furnish nitrogen for other crops, but to hasten the liberation of the phosphorus.

I should remind you that the discussion in this paper applies directly to what is everywhere recognized as the common prairie soils of the Illinois corn belt. Time does not permit a discussion of the many other normal and abnormal types of soil found in this State, such for example as the yellow silt loam of the worn hill lands, most deficient in nitrogen and humus; the strongly acid soils found most extensively in southern Illinois and to some extent in other sections; the sand soils which also can be made highly productive by profitable methods; the heavy black gumbo soils found in places on the flat prairies, the richest and most durable upland soils in the State; the peaty swamp lands on which 13 car loads of potassium chloride were used only in the vicinity of the Tampico experiment field in 1907, at a cost of about $13,000 and with a net profit of more than twice that sum; nor can I discuss here any one of more than a hundred other different types of soil already found in the detail soil survey of Illinois.

Attention is called to the fact that a full report of the general soil survey of Illinois is given in Experiment Station Bulletin 123, "The Fertility in Illinois Soils," which includes a colored map showing all of the great soil areas, hundreds of soil analyses representing twenty-five of the most important and extensive soil types in Illinois, and typical illustrations of results obtained from different kinds of soil treatment and soil improvement on soil experiment fields in all sections of the State. Besides this, the bulletin contains some definite information, relating to the plant food required by different crops, the sources, approximate cost, and methods of using different plant food materials.

Attention is also called to the fact that the detail soil survey of Illinois already covers nearly twenty-seven counties. In this detail survey every type of soil is mapped, the extent, location, and boundary lines being determined. Soil samples are collected from every type, and these are being analyzed, and pot cultures and field experiments are being conducted so far as possible, so that, when the county soil maps are published, the report may also include definite information relating to the stock of plant food in every type of soil on every farm, together with tried methods for maintaining or improving its productive power.

A full statement concerning the progress of the detail soil survey by counties has been prepared by your own committee on Experiment Station work for publication in the annual report of the Illinois State Farmers' Institute for 1907.

In conclusion let me emphasize the fact that the Illinois Experiment Station has always advised against the use of ordinary commercial fertilizers, and we now still more strongly advise against the use of such fertilizers. Why? In small part because they tend possibly to injure the soil, but in large part because they are used as soil stimulants and not for soil improvement. They are so expensive that no general farmer can afford to use them in sufficient amount to actually enrich his soil, but only to supplement the plant food forced from the soil, while the land itself becomes poorer and poorer.

To buy in ordinary 2-8-2 commercial fertilizer sufficient phosphorus for a hundred-bushel crop of corn would cost from $8.00 to $10.00; to buy the potassium would cost from $40 to $50; while the nitrogen would cost at least $90 for such crop of corn.

On the other hand, no man ought to be blinded by an ignorant prejudice. There is a difference between $8.00 for 250 pounds of phosphorus in a ton of natural rock phosphate and $80 for the same amount of phosphorus in 4 tons of manufactured acidultated mixed commercial fertilizer. Natural rock phosphate is the kind of phosphorus originally contained in the soil, and it may be applied at any time and in any quantity with no danger that it will ever injure the soil, and it will remain in the soil until removed by crops.

Even in the case of lime for acid soils, we do not advise the use of burned lime, but always the natural product, fine-ground natural limestone, exactly the same material as is contained in the natural limestone soils.

I close with a final word on the functions of humus: Humus has well been called the life of the soil. Humus not only improves the tilth and texture and absorbing and water-holding power of the soil, but humus controls in large measures the supply or availability of every valuable element of plant food. In the production of humus from clover we secure the nitrogen taken from the air. As the humus decays in the soil the potassium and other elements present in inexhaustable amount are gradually dissolved and made available for the growing crop; and because of this power of humus we are able to make use of low-priced phosphorus applied in amounts more than sufficient for large crops and depend upon the decaying and fermenting organic matter to decompose and dissolve the otherwise insoluble rock phosphate.

To adopt and maintain a system that will increase the phosphorus and humus in our common Illinois soils is to adopt and maintain a system of permanent prosperous agriculture for Illinois people.

NOTES.

NATURAL ROCK PHOSPHATE.

Fine ground raw rock phosphate, containing from 10 to 14 per cent of phosphorus, can be obtained from the Mt. Pleasant Fertilizer Co., Mt. Pleasant, Tenn.; from Robin Jones, Nashville, Tenn.; from the N. Y. & St. L. Mining Co., St. Louis, Mo.; from the Swan Creek Phosphate Co., Chicago, Ill.; from the Jackson Phosphate Co., Mt. Pleasant, Tenn.; or from R. G. Alexander, Mt. Pleasant, Tenn.; delivered in bulk on board cars at the mines in Tennessee for $2.50 to $5.00 per ton, the price varying with the quantity. The freight rate from Tennessee to most points in southern and central Illinois is $3.00 to $4.00 a ton, and $1.00 to $2.00 higher to northern Illinois points.

It should be borne in mind that rock phosphate varies much in quality. Consequently it should always be purchased upon a guaranteed analysis and it is advisable for the purchaser to take an average sample of the carload when received and have it analyzed, even though it cost him $2.00 or $3.00 for the analysis. To collect an average sample take a small teaspoonful from about fifty different places in the car, not only from the surface but also from different depths. These fifty spoonfuls well mixed together will make a trustworthy sample, and about one pound of this should be sent to some commercial chemist for analysis.

If 12½ per cent rock, containing 250 pounds of phosphorus per ton, costs $7.50 (including freight), then 10 per cent rock, containing 200 pounds of the element per ton, is worth $6.00, a difference in value of $1.50 per ton, which amounts to $45 on a 30-ton car or rock phosphate.

The important phosphorus compound in rock phosphate is calcium phosphate, $Ca_3(PO_4)_2$. The percentage of this compound in the rock phosphate marks the purity of the rock. Thus, if the rock phosphate contains 60 per cent of calcium phosphate, it is 60 per cent pure, with 40 per cent of impurities.

The natural rock prosphate deposits now being mined vary from about 50 per cent to 70 per cent, and we consider 62½ per cent as a good average grade. The impurities consist of sand, shale, and other earthy materials naturally occurring in the phosphate deposits. The compound, calcium phosphate, is sometimes called bone phosphate, because it is the phosphorus compound in bone; it is also called lime phosphate, although it does not contain lime as such and has no power to correct soil acidity; and in the wholesale trade this compound is called "bone phosphate of lime" (B. P. L.) It is important to know that this compound itself is absolutely constant and always contains exactly 20 per cent of the element phosphorus, so that rock phosphate which contains "60 per cent B. P. L." must contain 12 per cent of phosphorus.

Sometimes the guarantee is given as "phosphoric acid," meaning phosphoric oxide, P_2O_5. This also is a definite compound and always contains 43⅝ per cent of the element phosphorus. Thus, it will be seen that the same sample of rock phosphate may be guaranteed to contain 62 per cent calcium phosphate, $Ca_3(PO_4)_2$, or 28.4 per cent of "phosphoric acid" (P_2O_5), or 12.4 per cent of phosphorus (P).

BONE MEAL.

A good grade of steamed bone meal (about 12½ per cent phosphorus) can be obtained delivered in Illinois for about $25.00 a ton, from the local agents of Morris & Co., Swift & Co., the American Glue Company, or the Packers' Fertilizer Association, Chicago, Ill., or from Michigan Carbon Works, Detroit, Mich.

POTASSIUM SALTS.

Potassium chloride (so-called "muriate" of potash), containing about 42 per cent of potassium, can be obtained for about $50 a ton from Armour & Company, Union Stock Yards, Chicago, Ill.; from A. Smith & Bro., Tampico, Ill., or from American Agricultural Chemical Co., New York, N. Y.; and kainit, containing about 10 per cent of potassium in the form of potassium sulfate, together with some magnesium sulfate, magnesium chlorid, and sodium chlorid, can also be obtained from Armour & Company and from Darling & Company, Chicago, Ill., for about $15 a ton.

GROUND LIMESTONE.

Ground limestone can now be obtained at 75 cents a ton from the Southern Illinois Penitentiary, Menard, Ill., and at different prices from Casper Stolle Quarry & Contracting Co., St. Louis, Mo. (quarry at Stolle, Ill.); Southwestern Contracting & Engineering Co., East St. Louis, Ill.; Crystal Carbonate Lime Company, Elsberry, Mo.; Carthage Superior Limestone Co., Carthage, Mo.; Mitchell Lime Company, Mitchell, Ind. Some of these companies furnish fine-ground limestone and some furnish limestone screenings, which include both very fine dust and some coarser particles even as large as wheat grains. In carload lots the price on board cars at the plant varies from 50 cents to $1.00 a ton according to the fineness. The freight charges will vary from 50 cents or less to $1.50 or more, depending upon the distance. At most points in Southern Illinois the cost delivered in bulk in box cars should be between $1.00 and $2.00 a ton. The quickest action will be secured by using the finest material and mixing it most thoroughly with the soil, but sometimes one can get one and one-half tons of material containing one ton of fine dust and half a ton of coarser particles, varying in size from less than pin heads to wheat grains, at no greater expense than would be required for one ton of fine-ground stone containing no coarser particles.

CHEMICAL ANALYSIS.

The Agricultural Experiment Station does not undertake to analyze samples of fertilizers, soils, or other materials for private parties. First, because the total annual appropriation for the investigation of all of the soil problems of the State is less than 12½ cents for each quarter section of Illinois land, while to analyze a soil or fertilizer would cost many times that amount, so that it would be impossible to make analyses for all. Second, because the Experiment Station is established for the investigation of problems of public interest, and not for the inspection or control of private investments or enterprises.

That farmers generally understand and appreciate the fact that the State Experiment Station cannot, and ought not, to make such analyses is evidenced by the fact that, with few exceptions, there has been no demand by Illinois citizens for such private work at public expense. That it would be impossible to do such work for all Illinois citizens is also evidenced by the fact that we have received as many as eleven samples of soil from one man with the request that they should all be analyzed.

Analyses of miscellaneous samples of soil, collected by unauthorized and untrained persons, by inaccurate and non-uniform methods, usually imperfectly representing even a definite stratum from a single field, or sometimes a mere sketch of ground, might be of little value even to the owner of

the piece of land, and probably of no value to the agriculture of the State; while to attempt to do such work would only delay the progress of the systematic detail soil survey which, as already explained, is being made to cover every type of soil on every farm.

All soil samples taken for analysis are collected by Experiment Station men, who are familiar with the most accurate means of sampling soils, in order that the samples shall be taken by uniform methods which shall render them comparable, and that they shall be truly typical samples of the different strata of the type of soil which they are to represent. If the samples do not represent the definite soil type of a known area, the analyses would of course be misleading and practically worthless.

It will never be possible for the Experiment Station to analyze the soil from every field of every Illinois farm, but it is possible and practicable to map the soils of the State in detail, and then to analyze representative samples of every type, so that ultimately every farmer can know what type or types of soil cover his farm, what the average composition is of each type, what crops are best adapted to the different soils, and what kinds of soil treatment or management are required to maintain or increase the crop yields. [Applause.]

Chairman—The annual reports, volume 12, that have already been referred to by Dr. Hopkins, are in the building. We would be glad if you would take two copies of these, when we adjourn; one for yourself and one for the school teacher in your district. We have here Illinois Farmers' Institute Bulletin No. 10, containing an account of the second Grout Encampment, the one that was held last summer, we have a supply of those besides, and we are very anxious that you take a supply, and by supply I mean a dozen or so of these cards, they are cards to be handed to the boys and girls in your vicinity, when you go home, just write in their names, put a one cent stamp on it, and it will just keep them up with all this business we are having on the platform, and with the work that is going on at the experiment station of the Agricultural Department of the University of Illinois. Take a dozen or fifteen of those with you, so they will go into the hands of the boys and girls at home who did not have an opportunity of coming to this meeting.

Now we must begin the session this afternoon if possible on time, because it is a long session. At 1:30. I will ask Mr. Smith and Mr. Allen to come up here quickly and we will distribute all this material. We are now adjourned until 1:30 this afternoon.

Adjourned.

SECOND DAY OF INSTITUTE.

WEDNESDAY, FEBRUARY 12, 1908, 1:30 O'CLOCK P. M., AFTERNOON GENERAL SESSION, COLISEUM.

Superintendent Frank H. Hall, Presiding.

Music—Solo..............................Miss Elizabeth Kintzer

Chairman—Ladies and gentlemen, there are so many things on the program this afternoon, that we must not delay any longer for the people to come in.

I do not believe that the farmers of Illinois have any conception of the great experiment that is being made in our own State with reference to soil fertility, an experiment that is attracting attention from every other state in the Union, as well as from the countries of the old world. The like of it has never before been attempted, and just as Judge Humphrey said yesterday morning, "When the people of Illinois shall have learned to use their soils without abusing them, we will have written a new page in the history of the world." And we have here this afternoon, the leader, the originator of that plan, and he is going to spend a little time in telling us of the fundamental things that must be understood in order to read intelligently the matter that is put out bearing upon this great experiment in the conservation of soil fertility. He is going to tell us of the very things that we think should be told in every high school in Illinois, so that the next generation may understand more fully this great work that is being carried on in this State.

I take great pleasure in introducing to you now, Dr. Cyril G. Hopkins. [Applause.]

ADDRESS: "AN ELEMENTARY LESSON IN AGRICULTURAL CHEMISTRY."

(Dr. Cyril G. Hopkins, University of Illinois.)

MR. CHAIRMAN, LADIES AND GENTLEMAN—Everything is more easily understood if we can begin at the bottom; yes if we can begin at the bottom. But if we try to deal with subjects when we cannot get our feet on the ground, so to speak, why, then, things are hazy in our minds and it is difficult for us to know just where we do stand. The bottom of this question of the building of plants and of animals rests with the materials out of which they are built and the substances that enter into the construction of them.

The architect who designed this building and the builder who contracted to erect it knew the materials out of which he must construct it, and he had to know where these materials could be gotten, what the supply was in the world, about what they are worth, and many things of that sort. He had to have that information. Stock feeders know very well that it takes materials to build animals. To take a calf that weighs 200 pounds and make him weigh 1200, 1400 or 1600 pounds, requires material to enter into the construction of that animal and develop it. The ordinary stockman can tell you about how many pounds of clover hay and corn, and maybe a few other materials, he would like to put into the ration, just about how much it will take to make an average 200-pound calf weigh 1400 pounds. But the thing not thought very much about is, *what does it take to make the corn and the clover hay*. There is a sort of a feeling that those things must be made out of nothing. They just *come*, from one place to another, and man don't stop to think very much that corn must have materials supplied for its own structure. We know very well that we must have corn and clover hay to make a steer. Well, we must have materials to make the corn and the clover hay just as certainly.

Now, I cannot take the time to discuss in detail all the things required to make corn. I might say there are ten different kinds of plant food, and every one of them is absolutely essential to the making of the corn plant. If any one of those ten is omitted in the food of the corn plant the corn plant cannot be made. It is impossible to make the plant and leave out any one of them. Some of them are small in amount, it doesn't need large quantities of all, but it needs some. Some of the materials are present in the atmosphere, or in the soil, in very large quantities. Some are present in very small amounts compared with what is required for the crop.

Now, those ten different things that are required to produce crops, you might say they are required for every agricultural crop, the same ten things, only united in different ways, different proportions, the same ten materials are required for every one of our ordinary crops. They are known as elements. Elements of fertility, elements of soil fertility, elements of plant growth, and I think we cannot do much better than just to stop a little time to consider what an element is—what we mean by a chemical element.

I think I can illustrate that perhaps best by taking some one of our common materials and reduce it to its elements. Take corn, for example. We have an ear of corn. Now you can divide the ear of corn into different things and see what is in it. Divide it first into the cob and the shelled grain and you have different materials; then you can take the shelled grain, and again you can divide that into different materials. You can take out the part that we call carbohydrates; you can take out the fat or oil. It is done in the factories right along, and thus we get oil out of corn. You can get protein or nitrogenous materials out of corn, that is done in the mills also. You get ash materials also out of corn. So we can divide shelled corn into four principal parts: carbohydrates, fats, protein, and ash material matter. Those are four different groups of substances. We have not reached the element yet. We have gotten out four different things, but each of these is still complex. Take one of those groups of substances, like carbohydrates. Carbohydrates constitute a large group of related compounds. Let us divide that group and see what it is made of. Carbohydrates contain starch, sugar, cellulose, or fiber, pentosans, and a number of other materials. Thus we divide corn into several substances and divide each part again and again into two or more different products. One of these is sugar. You say, "What is that?" Well, we can take sugar and divide that into three different things. Sugar contains carbon and hydrogen and oxygen. Then you might go on with this. Take carbon. What is carbon? That is one of the things you have gotten out of sugar. What is carbon made of? But the only answer to that question is, that carbon is carbon; and whenever you reach that point, where you cannot divide a thing into two different things, then you have *struck bottom*. Then you strike what is known as the chemical element, and it is those materials, materials of that kind, that are required to make crops. There are ten of these elements. Carbon is one, hydrogen another, oxygen another. Those three elements come from air and water—and I won't take time to discuss them further.

There are four elements that are contained in soils in very large amounts as compared with the needs of crops. They are not required by crops in large quantities. They are calcium, magnesium, iron, and sulphur. All of these elements are quite common and familiar to you. Iron and sulphur you know very well. But those four elements, I say, are contained in practically all soils in such large quantities, and contained in the crops in such small amounts, that they perhaps never become deficient in the soil. For example, there is enough iron in our ordinary soil in the first seven inches of an acre for one hundred bushels of corn, every year, for 240,000 years. That leaves us then only three elements that are of very considerable importance. They are nitrogen, phosphorus, and potassium.

Now, people sometimes rise and say, "Let us not talk about technical things. We don't like to hear a speaker use technical terms." But I think it is worth while for us to consider a moment whether it is not just as well for us to talk about technical things. Suppose you want a railroad man, a brakeman, to handle the trains upon which we ride. A man comes along and he gives him a little instruction as to how to take care of the trains. He says, "You have to do so and so with this automatic coupler." Why, "automatic coupler," he says, "That is a technical term, isn't it? I don't like technical terms, I don't want to know anything about technical terms." Well, what do you suppose a railroad man would say to him.

If you will look into the matter of technical terms, you will find that they are commonly looked upon as being terms that apply to some other man's business, that we don't know about. They are not technical terms to him, or if they are, they belong to the technique of his business and he knows what they are. Now, a man might say, "I wish you would not say anything about nitrogen, phosphorus or potassium, because they are new terms to me"—they are not nearly so new now as they used to be in this State years ago. The farmers now talk about nitrogen, phosphate and potassium, even though they may never have heard of it ten years ago; and these are what they call technical terms, but I don't know of any other words to use. I do not think the farmers are babies, any more than railroad men are babies. The Illinois Farmers' Institute, the Experiment Station, and the College of Agriculture have always taken the view that farmers are just about as intelligent people as anybody, and just as apt to learn the names of things that apply to their business. You might say, "Can't you give me some common name for nitrogen?" Why, there isn't any other name, unless you take some foreign name. You might call it *Stickstoff*, one of the German names for it, or *Azote*, the French name. But "nitrogen" is our name for it, and there is no other name in the English language for it. We simply learn what it is and some of the properties of it.

Now, that is what we mean by the elements. I am not going to talk long about the elements.

I have an element here, carbon. If you take any organic matter that contains carbon, hydrogen or oxygen, like sugar, or starch, and drive out the hydrogen and oxygen—which you can do—you have carbon left. Pure carbon. This is a black substance called charcoal, made from soft wood. It may contain a trace of mineral matter, but aside from that, it is almost pure carbon. [Illustrating.] Now, there are a good many other elements. Here is an element you know pretty well. It is called sulphur.

Now, besides learning what an *element* is, I think we ought to have in mind another material or great group of substances that are called *compounds*. I think those two words ought to be familiar to us, because we may have these elements by themselves, and they may be chemically united; and then they are called compounds. And the character of substances seems to change very greatly. When two elements unite chemically, they seem to make a different substance; but they don't make anything more than what goes in. You can't make something out of nothing. And these two elements, carbon and sulphur, unite and form a compound; one atom, or one combining weight, of the carbon, unites with two atoms, or two combining weights, of the sulfur, and they make a compound that has only one name, and that is Carbon Bisulfid. Now that is the scientific name,, the technical name, carbon bisulfid, but see how much it means. You know the chemical names are simple. These technical or scientific names always carry a meaning, they are easy to understand. Carbon bisulfid tells you what it is, just one of carbon and two of sulfur, and you know that when they unite this is the substance we get at the ordinary temperature. [Illustrating.] This is carbon bisulfid, which is a light, limpid liquid. When absolutely pure it is entirely water-white, entirely colorless. There is nothing else in it except those two solid elements, carbon and sulfur. That is what we mean by the difference between an element and a compound. A compound always contains two elements and may contain three, four, five, or more. Very many have only two. A large number of compounds have three elements united and they change their forms or appearance in some way so you would not recognize them, as with the sulfur or the carbon in that colorless liquid, but those two things are all there is in it. If you bring those two elements together at a proper temperature, they just unite, and this is what you have left. These two disappear. [Indicating.] Then you may take those two elements out again.

Some of the elements are very common to us. We have elements in the solid form, as we have here, or we may have elements in the form of gas, at an ordinary temperature, like nitrogen and oxygen in the air we breathe. They may be in the form of a liquid or solid—any of these forms, as a matter of fact, you can take almost any simple substance that we have and that can be changed from the solid to the liquid or to the gas form. You can take sulfur; it is solid at the ordinary temperature. You only have to raise the temperature a little bit and it becomes a liquid, then raise it still higher and it changes to gas, at a high temperature.

You can take air and make liquid air. Perhaps most of you have seen liquid air. That can be reduced on down until at low enough temperature you can freeze it and make solid air. Nearly all of these substances may be changed from one state to the other by greater or smaller changes in temperature, and without changing the element itself, but even at ordinary temperature, you can change from solid to liquid in many cases just by making two or more elements into a compound.

I have here another element, which some of you know, called mercury, or quicksilver. That is rather a peculiar element, it looks like a metal, yet it is a liquid. It is a very heavy liquid. You see it is an elementary liquid now. Here is another element which we call iron, and you know that iron is very heavy; you know how heavy it is. [Placing the iron, a cold chisel, into the mercury.] That illustrates one property of that liquid element. The mercury is the heavier element. The iron floats in it just like a cork. I take that liquid and gradually raise the temperature a little, and it unites with the oxygen and the air. Then it becomes a compound, called mercuric oxid, just named from the two elements. This is the substance; that compound is mercuric oxid, just two elements, when the temperature is proper they unite. Take that and heat it a little bit, and it will break right up into the two elements. But I haven't time to do that his afternoon. Then when you break up this solid compound into the two elements, the oxygen will pass off as gas, and the mercury will appear in the liquid form. Thus, can matter be changed from one form to another.

Now, that is not strange. You know such things are going on about you everywhere, just as striking as that. For example, you take 100 pounds of coal, a black solid substance which is mostly carbon—a little hydrogen in it. Take 100 pounds of coal and put it in a furnace. After the coal has been heated up to the kindling point you open up the vent and let the oxygen of the air in, and you come back three or four hours later on and look into the stove, and you have left five pounds of ashes there. That is all there is. About 95 pounds of the solid substance that you shoveled in is gone. Well, it has just united with the oxygen of the air. This element of carbon in the coal is united with the oxygen. Now I take two parts of oxygen, united with one of this (carbon), and see the result. We get what is called carbon dioxide, one part of carbon and two parts of oxygen. That is a gas (instead of being solid); the gas passes up the chimney. So that in burning 100 pounds of carbon, more than 300 pounds of carbon dioxide goes up the chimney. That goes on regularly. As I may say, it is a very common thing.

Water is a compound. The material we drink here, that is compound. It is not a single element, there are two elements in it, and both of them are gases at an ordinary temperature, these elements are hydrogen and oxygen. They are both in water. When you separate them, they are both gases. One of these elements can very easily be liberated. I will show you in a moment, we will liberate some from water, but first I want to liberate some from sulfuric acid, because sulfuric acid contains hydrogen. All we have to do to liberate it is to bring it in contact with some metal substance, like zinc. The zinc goes in and drives out the hydrogen. As soon as the zinc liberates the hydrogen from this acid, the hydrogen goes off as gas. I put some zinc in the bottom of this flask. It is necessary to add a little sulfuric acid, when it will begin to foam. It will foam and boil pretty soon. [Illustrating.] And we have the hydrogen coming out. Here is the hydrogen coming out. Hydrogen is light in weight—the lighest of all known substances. I want to collect some in this test tube. It may seem a little strange, but in order to collect the hydrogen in that, I hold that bottom-side up. That is the only way I can hold it. If I turn the other side up, the hydrogen will all leak out. By turning this right bottom-side up, I can hold it, because the air is heavier than the hydrogen. The hydrogen falls to the top here, and forces the air out.

Now, hydrogen will burn with the oxygen in the air. The hydrogen will unite with the oxygen and burn. The mixture of the two will explode. That is the reason I collect it first, in this, to see whether it is explosive. Now, there is a little coming off there, you see a little flame. As that burns, the hydrogen coming in this flask unites with the oxygen, in the air and makes water. That is the form of water [Illustrating.] Of course it is in the form of vapor, but it can be condensed, or changed back to water again.

Now, we can change substances from the liquid to the solid state, we can change them from the solid to the gases, and we can change them from liquid to gases, or back and forth, in various ways. I have three elements here: They are silver, nitrogen and oxygen; united they will go into solution in water. We have a concentrated salt here, ammonia chlorid, or what you may call sal ammoniac. Then we have a solution of silver nitrate, sometimes called lunar caustic. If I bring those two together, the silver in this salt and the chlorin in this salt will form a different compound called silver chlorid. Now, that is insoluble, so we change from the liquid state to the solid state. There, you see we have that. Of course we have a little of the water left in there, but you can see how much of this is solid. I have still got some hydrogen coming there in the other experiment.

Sugar, I said is a compound of carbon, hydrogen and ogygen; three elements, and if I have good luck, I can take the hydrogen and oxygen out of the sugar and leave the carbon. That can be done rather easily. In order to hasten the reaction, I moisten the sugar a little bit, with ordinary water. Now, if I can do anything that will just extract the water from that I can have the carbon left; and there is a material that has great power to absorb water; that is, sulfuric acid. It has such power to absorb water, has such an attraction for it that it will take it out of sugar and leave only the carbon. Now, I will try that and see whether we can or not. I just pour in a little of this sulfuric acid, then stir it up here, and see whether we can extract the water from that sugar. Well, you see, that is getting dark. I will leave it there where you can see it a little better, it may show a little better later on than it does now. We are still getting lots of hydrogen here, as you see by the large flame. Now, I have to be a little careful with that sugar experiment, if I don't get it mixed just right, why, it doesn't act quite as well, so I will start another one here, and probably one or the other will give us good results.

Now, I want to take a little time to talk to you about these three elements that are of greater interest to us.

Nitrogen is contained in the air in the form of gas, and I can't show you any, though we have plenty of it here, about twelve pounds to the square inch, here in the room, and all over the earth's surface. You have some of it in your pockets and you are breathing it all the time. But it is colorless, so that I can't show you any nitrogen. I can show you some compounds of nitrogen, one particularly that I have here, in that jar. I have nothing there but nitrogen, hydrogen and oxygen, those three elements. There are the hydrogen and oxygen contained in water, and then here is the nitrogen, united. This we call ammonium nitrate. It has nitrogen in both ends of the compound, nitrate and ammonia, united; this is ammonium nitrate. This contains 35 per cent of the element of nitrogen. Ammonium nitrate.

It has been the dream of chemists to try to discover some means by which we could take nitrogen from the air and put it in such a compound as this, because the corn plant has no power of using the nitrogen from the air. It stands in it, grows in it, but it cannot touch it. That is true of oats and wheat, barley, rye, sugar beets, all of the plants, agricultural plants, excluding the legumes like clover, soybeans and alfalfa. Those are the only agricultural plants that have the power to take the nitrogen from the air, and they don't do it by themselves. The clover plant, has absolutely no power to get nitrogen from the air, it is only the bacteria, that live in the little nodules on the roots of the clover plant, or that may be there, that have the power to take the nitrogen from the air. The chemists have endeavored for a long time to see whether they could not find some means by which they could make the nitrogen of the air unite with some other elements and put in the form of a solution to be absorbed through the soil by the agricultural plants for food. We have been bringing ship loads of sodium nitrate from Chili, in South America, to this country and to Europe. We found some nitrogen of a solid form, in the form of nitrate of soda, or Chili saltpetre; and nearly all of the organic materials have value for their nitrogen contents. Manure has high value for nitrogen—and dried blood, cotton seed meal and things of this sort.

Within the last few years chemists have been working upon this problem and they now have two commercial processes by which nitrogen can be taken from the air and put into a form to be used for plants. One of those is a direct electrolytic process, by which nitrogen is made to combine with oxygen of the air and form nitrogen oxid. That is united with water forming nitric acid, then that solution is usually treated with lime to make calcium nitrate. It is just as good a fertilizer as sodium nitrate. It is now on the market in commercial form.

There is another process in which they use as a starting point calcium carbid. Now, you must all know what calcium carbid is, it is used in the bicycle and automobile lamps, used sometimes for making gas for houses, simply called carbid for short, but it is calcium carbid. It contains two elements, calcium and carbon, and when water is put in with it, the hydrogen from the water unites with the carbon and you get a gas coming off, containing carbon and hydrogen, and it is commonly called acetylene gas, formed from the carbon and hydrogen. And starting with that same calcium carbid, it is found, at the highest temperature you can make nitrogen unite with it. It then forms what we call calcium cyanamid. I will not ask you to remember that, particularly, but you will see it in the papers. For short it is called cyanamid, with which everybody must become familiar. Calcium cyanamid is now an article of commerce, thousands and thousands of tons being used.

Now, there is a very interesting thing about that; when you put water on calcium cyanamid instead of getting acetylene gas you get ammonia; by the other process I mentioned you get nitric acid. Now, when you bring together nitric acid from the electrolytic process, and ammonia, made from the carbid process, you get ammonium nitrate. That is this material, [Illustrating] with nitrogen contained in both ends of the compound, you might say. This is more than twice as rich in nitrogen as the sodium nitrate brought from Chili, and for long-distance shipping probably this will be the material used; but, on the other hand, I feel like repeating what I said this morning, that for any price for which it is upon sale, has been sold or is likely to be sold, or any price at which you can buy nitrogen, in sodium nitrate or in any other forms on the market, you lose money for every pound you buy for use in general farming, whether it is in the form of calcium cyanamid or in any other forms now on the market. That is, for the production of ordinary crops, as corn, oats, wheat, clover, timothy, on ordinary soil you lose money on every pound you buy, because it will not make increase enough to pay its cost. There may come a time when we can use some material like this, when labor becomes very cheap, and land very high. It is used in market gardening now. Of course, when you sell from one acre three hundred dollars' worth of stuff, early potatoes, radishes, beets, etc., you can afford to buy nitrogen at 15 cents a pound, but you can't afford to buy it to grow corn with.

Now, the people ask sometimes about getting phosphorus. I talked about that this morning. You may remember, I said, you can get 250 pounds of phosphorus in a ton of rock phosphate. You can get 250 pounds of phosphorus in a ton of bone meal, and people ask many times, "Why can't we get a ton of phosphorus in a ton? What do we want to buy the other stuff for, why do we want to buy 100 pounds of stuff with only 12½ pounds of phosphorus?" I think we can explain that somewhat. I have some rock phosphate here, the analysis shows 12.97, about 13 per cent of phosphorus. That means in 100 pounds I have 13 pounds of the element phosphorus; in a ton of it there would be 260 pounds of phosphorus. Now, this ground rock contains the compound that we call calcium phosphate. I think it is well enough to remember one thing, I will ask you to remember, that the three letters, "a-t-e" on the end of a chemical name always means "Oxygen." We use that just for short. Whenever you see "ate" on the end of a true chemical name of any ordinary compound you will know there is oxygen in it. So, when I say, calcium phosphate, if you know that one thing, you may then know what is in calcium phosphate. You know there is calcium, which is one element, phosphorus, which is another element, and oxygen, which is signified by the "ate" on the end. Copper sulfate. That tells you right away what it contains. That is the value of a technical name. Copper sulfate contains copper, sulfur, and ogygen, the "ate" means oxygen. It means a good deal more to say copper sulfate than it does to say "Blue stone." Nobody would know what blue stone contains. You might learn of course what is in it by main strength and akwardness, but there is nothing in the name to signify what blue stone is. Blue stone is copper sulfate. I would not say blue stone. You can't say it very much shorter any way, you can say copper sulfate. That tells you all about it. It tells you just exactly what is in it, and you know just what you are talking about. Those that use blue stone don't know anything about it, don't know what it contains, copper, iron, or what.

There is a compound contained in this natural rock. called calcium phosphate. Now calcium phosphate is a definite chemical compound. That is a peculiar thing about chemical compounds. That is why chemistry is an exact science. The peculiar thing is that *the ratio of the elements is always the same*. In pure calcium phosphate there is always a certain percentage of phosphorus, always a certain percentage of calcium, and always a certain percentage of oxygen. These three percentages add up to one hundred. And the phosphorus never varies. If you will give me, or any chemist, a quantity of pure calcium phosphate, and tell him how much phosphorus there is, the number of pounds of phosphorus in an unknown quantity of material, he can tell you how much oxygen and calcium there is in combination with the phosphorus. He does not have to analyze it for calcium or oxygen because that ratio is absolute. Well, calcium phosphate, that pure chemical compound, carries 20 per cent of phosphorus; never more, never less, if it is pure. So the calcium phosphate contained in this ground rock, however much of that pure compound there is in here, carries 20 per cent of phosphorus. If this is one-half calcium phosphate, and one-half sand, iron compounds, clay, and other earthy materials, then there is 50 percent of calcium phosphate; 20 per cent of that, or one-fifth of the amount is phosphorus.

By dividing calcium phosphate by five we get the phosphorus exactly. If this rock is 50 *per cent pure*, or 50 per cent calcium phosphate, there is 10 per cent of phosphorus. It can not be more.

Here is some pure material, that is pure calcium phosphate. That carries 20 per cent, because that is one hundred per cent pure. There is nothing but those three elements, calcium, phosphorus and oxygen, always in that definite proportion. But this ground rock is only 65 per cent pure. In 100 pounds of that rock there are 65 pounds of this compound, and one-fifth of that 65 pounds is phosphorus. That is the absolute ratio.

Now, we have other forms and compounds of phosphorus that may run higher. Here, for example, is a pound of phosphoric acid in these little sticks. It looks like candy. It contains 39 per cent of phosphorus. It is phosphoric acid in the solid form, sometimes called glacial phosphoric acid, one combining weight of hydrogen, one of phosphorus and three of oxygen. When you figure out these weights you find 39 per cent of the element of phosphorus in that material. Now, I have here a material that carries 100 per cent of phosphorus. That is the element itself. I have a small quantity of it, a little piece down there in the bottom. I want to show you a little of that. I might say I brought only a little piece, because I don't like to carry around a big piece of it. Phosphorus in the free state is a very curious material. It has power to take fire in the air, and we keep it under water to prevent it from taking fire. Now, I will just chip off a little piece of that. You see that has begun to smoke a little. I don't want to keep it out in the air, for if I keep that out five minutes probably it will take fire; I don't want it to do that. When it takes fire it melts, and if one has it in his fingers, it is inclined to run all over his fingers just like molasses, and it is sticky, and it makes awful burns.

Now, you see a white substance coming off there. That white substance floating in the air. It is phosphoric oxid. This substance here [Indicating.] That material, of course, is light now, but if you get a quantity of it together it becomes solid and looks a good deal like this, although it does not contain calcium. [Indicating.]

Any material when it gets fine enough will float in the air as dust. Some of the material remains there on the plate. If I let water unite with it, it will form phosphoric acid, about the same material that I showed you here. I might say, that phosphoric oxid, the material that was burned with the white powder, carries 43⅝ per cent of phosphorus. The remainder is oxygen.

You can't get 100 pounds of phosphorus in 100 pounds of fertilizing material, because no man would touch it. No man would want to handle it. If you let it touch the plants exposed to the air, anyhere, it will take fire and go right over to the oxid form, uniting with more than its weight of oxygen, then as soon as it comes in contact with moisture, the oxid unites with the water and forms phosphoric acid, and that too is injurious to plants. Phosphoric acid as soon as it gets with the lime in the soil unites with the element of calcium and instead of phosphoric acid you have calcium phosphate; that is this compound [Illustrating]. And that will remain, but up to that compound there is not one of those compounds that you can keep unless in glass bottles, or something of that sort. You expose phosphorus on the land and it will go from phosphorus right over to this compound, calcium phosphate, if it can get the oxygen and water from the air and the lime out of the soil.

Now, this phosphoric acid has some peculiar properties. It has the power to change the color of some of the organic substances. I think I can show you just in a moment. I have here some phosphoric acid, and here a compound, that I won't ask you to remember the name of, called phenol phthalein. I put a little phenol phthalein in there. Now, you see, that is gone. [Illustrating.] Now, if I put in that just a trace of alkali, such as I have here, it will give a red color. I don't want very much there. Now, the alkali is the opposite of the acid. If I have any acid here, then it will have power to change the color of this solution, that it, it will change it back to the water white, if I have the right amount of the phosphoric acid there, but I think you can see it is coming out colorless. Thus, the acid we have made out of the phosphorus, the phosphoric acid, changes the color of the solution. I may not have enough to destroy all of it, but it has destroyed it as far as it goes, now. Yes—I made enough acid out of that phosphorus to neutralize all the alkali that went into it, and the red color is entirely gone.

Now, there is one other element that we are interested in, that is the element of potassium,—the other one of those three valuable elements. There again, one might ask, "Why can't you get potassium all by itself in pure form"? I will show you why we cannot get potassium in the pure form. Here we have some water. I have some potassium here that I keep in another small bottle. Only a small quantity of it, because I don't like to handle it much. This is the potassium. This is 100 per cent pure. 71 pounds of it is taken from the soil of an acre for a 100-bushel crop of corn. In the form we have it here, it looks like a metal, and as I cut it with a knife, a fresh cut, it is bright, metallic like. It is a little bit softer than lead, but if we have some of this put on the land you see what will happen to the soil when it is a little damp. (Takes fire when put in water.)

Now, you notice another thing perhaps, there, that is, that the solid potassium has a great attraction for the oxygen and hydrogen in the water, the oxygen particularly. Water contains these two elements. In the molecule of water there are two atoms of hydrogen and one of oxygen, and when the potassium unites with it, it takes the atom of oxygen with one of the atoms of hydrogen, and liberates the other part of the hydrogen as a gas. It was that that took fire and burned there, you saw the flame, you saw that potassium decomposes water and drives part of the hydrogen right out of the water, and it burned by uniting with the oxygen of the air. This union with oxygen again produces water. Thus, it passes back to water again and this water vapor passes off into the air. The potassium, united with the oxygen and half of the hydrogen in the water, makes a compound called potassium hydroxid and that compound just tells you what it is, it is potassium, hydrogen, and oxygen, just shortened up a little bit and called potassium hydroxid. That is the same material I had in the red liquid before. I have got some of the hydroxid in that solution; that has the power to make the red color to the substance.

We have several different materials that contain potassium. Here is potassium itself; it is a metal. You can put that by itself in water and it will take fire. See what a time you would have with pure potassium in a rain storm. Nobody wants to handle it. It *will kill any plant that it touches*. Here is potassium sulfid in the union of sulfur with potassium. It contains 70 per cent of potassium. Here is potassium hydroxid; that is in the solid form and carries also 70 per cent of potassium. Here is potassium chlorid. Potassium united with chlorin makes potassium chlorid, almost the same as common salt. Common salt is sodium chlorid, and sodium has almost the same properties as potassium, except it has no value as plant food. Here is potassium chromate, that is nearly 40 per cent potassium. Here is potassium bi-chromate; these two contain potassium, chromium and oxygen. This compound contains 26½ per cent of potassium, that contains 40 per cent, the same three elements in a slightly different proportion, but I might say this is always the same proportion in that compound, always 26½ per cent, and in this there is always 40 per cent of potassium. Here is potassium permanganate, a still different compound, containing 25 per cent of potassium. Some compounds only have ten per cent. We buy this compound of potassium in commercial fertilizers as I mentioned to you this morning. In one county, last year, in Whiteside County, the farmers bought thirteen carloads of that material. It usually sells for about $50 a ton, a thousand dollars a carload, and is used on the peat loam soil where the element potassium is needed. That soil is five times as rich as our corn land in nitrogen and our richest soil in phosphorus, but it contains only one-tenth as much potassium as we have in ordinary soil, and farmers find large profit in using potassium salts on peaty soils.

Just one other thing, then I will stop. There is one other rather nice little experiment that goes along in connection with the coloring material. Now, just to show you how magicians sometimes use these materials to produce a good many different sorts of results. Suppose I take for example some of this sodium hydroxid. I put that in several beakers, just a trace of it, then take a trace of this sulfuric acid, a different material, and put that in other beakers. Now, suppose I had those all prepared from the beginning. Then I will turn them bottom-side up and show you that there is nothing in those beakers. You see? Then I will come along with this. It looks just like ordinary water. Pour it in here, then there is some wine. We put it in here, but there it is only water. Then we go here again,—and again we have wine [Illustrating,] then in this one, it gives us water. You don't know what you have. We put it all back in there and you see? It is all wine. It just depends on which substance those beakers contained a trace of. Well, you can have either one you want. That is water, now, I guess we want to make it wine. Well, we don't need to stop, because we can make it wine, if we want to. Starting at one end originally, I have wine, and at this end, water again. But it don't do to drink it. Well, you can change it back, you can have anything you want, but I think I will just change this to wine, because I don't want anybody to drink it. They won't drink it if I leave it in that form.

I thank you very much. I have taken all the time I ought to. [Applause.]

Note.—See report of this address by W. R. Lackland, Jr., a pupil in the Morton Township School, and by Hanna M. Kupel, a pupil in the Kingman High School, Peoria.—(Consult index.)

Chairman—Four years ago last summer Mr. Grout offered a premium to the boy in Scott county who would show the most skill in judging corn. Nineteen boys appeared in the contest. Ivan Hawk won the premium. The premium was a trip to Champaign, and a two-weeks' course of instruction at the Corn School. Mr. Grout has tendered something of this kind every year, and the phrase, "The Corn Judging Contest" is familiar to everybody in this State, and to many in other states. Indiana has to some extent followed this plan.

A year ago last summer Mr. Grout arranged for what is now known as the Grout Encampment. Boys from the twentieth congressional district were invited to come and spend a week, living in a tent on Mr. Grout's farm. Teachers were provided and instruction furnished on several subjects pertaining to agriculture. This last year it was repeated on the same farm, and there is a bulletin that can be obtained (I think the supply is not exhausted) giving an account of the work of this second year of the Grout encampment. This work has spread. In Gentry county, Missouri, this was repeated this year, and next year it is to be repeated in Moultrie county, this State. Mr. Grout is greatly interested in the education of boys, particularly those boys who are expecting to live on the farm, and the executive committee thought it would be quite proper to put him on the program to speak upon the subject of "The Education of the Boy as Related to His Prospective Life Work." Ladies and gentlemen, Mr. Grout.

THE EDUCATION OF THE BOY AS RELATED TO HIS PROSPECTIVE LIFE WORK.

Ladies and Gentlemen: I was cautioned when I was placed upon this platform, to be brief in what I had to say, and for that reason, also for the reason that I have not had an opportunity to give the subject much thought, I have reduced what I have to say to you to-day, to writing.

Quite recently I visited a tobacco plantation near Havana in a section that had been framed for nearly a hundred years. It was a most attractive sight, and especially in that country where modern methods of farming are not very much in evidence.

The thrifty and vigorous growing plants with their dark green leaves, perfect in almost every respect, contrasted strangely with the surrounding fields, and caused one to wonder how it all happened.

Inquiry revealed the fact that fertilizers had been used liberally. The rest was apparent; perfect cultivation, irrigation, spraying for worms, constant care and attention, and a paying crop. There was nothing like it for miles around. It was not because this particular piece of land was superior to other land in the vicinity, but it was because superior people with superior knowledge as to the requirements of the crop, were producing superior tobacco.

HON. A. P. GROUT.

What is true in Cuba, in this connection, is true in the United States and everywhere. The idea of superiority in farming or the ability to grow larger and better crops because of education or a better understanding of the requirements of the business, has never been appreciated by the farmer, and he is still content to educate his boy, if he is to be a farmer, in the district school.

The farm boy is educated for his life work by being taught how to read and write, a little arithmetic and geography, and perhaps, some minor branches, but not one word about the farm, the scene of his future activities. The practical part of his education is supposed to come from active work on the farm, and when he has developed the physical strength to do the things required, to drive the teams, to plow and cultivate, he is a farmer, and presumed to be fully equipped to meet every emergency that may arise in farming. He knows absolutely nothing of the elements of fertility in the soil or the demand upon these elements in the growing of a crop. He does not understand the necessity for a thorough preparation of the seed bed, or the requirements of the growing plant for heat, light, air and moisture. He has not the slightest conception of the effect of constant cropping—the continual drain upon the elements of fertility with no return or compensation for the elements so taken, and yet he is called a farmer.

As a matter of fact, he is just as much entitled to be called a surgeon as a farmer. Given a butcher knife and a saw, he has the physical strength to amputate a man's arm or leg, just as he has the strength and force to do things on the farm. He has just as much knowledge of surgery as he has of real farming. Physical strength is his only asset or qualification as a farmer.

The real surgeon must know the human anatomy thoroughly. He must know the exact location of every vein and artery and what to do in the event of a surgical operation. He must understand the use of anesthetics and, in fact, everything pertaining to surgery. He must know his business and be able to do whatever may be required of him in his line, but physical strength is only one of the very many requirements. There is no more reason why this one quality, alone should qualify a boy or man to be a farmer any more than it should qualify him to be a surgeon, a civil, mechanical, or electrical engineer, or anything requiring strength and force.

The tilling of the soil is no new calling for its history extends back to the earliest times of which we have any record. The fact that wherever the cultivation of the soil has been carried on without scientific knowledge and by the employment of unskilled force alone, depletion and exhaustion have followed, is a sufficient warning against the further continuation of such methods.

The mining process of working over the land for the purpose of extracting whatever of value there may be in it, without reference to its future condition, has resulted disastrously to every country on the face of the globe.

The popular idea that farming is an occupation in which ignorance is a more valuable asset than education and a clear and correct conception of everything relating to the business, is responsible for the perpetuation of those methods which have proven disastrous to farming interests everywhere.

It is a hopeful indication that the requirements of an agricultural education, a concise, definite, scientific knowledge of farming, in all of its various branches, freed from the old conceived notions of the moon's influences and the various so-called signs that have been handed down as heirlooms from the dark ages, are beginning to be understood.

Many farmers have come to believe in the application of brains to the land. It has been said that the great struggle today in agriculture is between the skilled and capable men and the incompetent who are a drag on the progressive spirit of the age.

On the proper education of the farm boy depends our ability to check the devastation that has been going on so long, to retain the fertility of our prairies and continue to grow maximum crops for all time. Of what shall that education consist? When shall it be imparted, and what means and methods can be employed that will reach the largest number and accomplish the most good?

The education of the boy for agricultural pursuits and a life spent upon the farm, surely does not contemplate that he must be versed in the ancient and modern languages, higher mathematics, literature and the various arts and sciences that have no relation or connection with his future calling, but it is a self-evident fact that requires no argument, that he who best knows and understands the business in which he is engaged, will best succeed. It naturally follows that the boy who knows the most about the farm, the soil, its requirements and treatment and how to grow maximum crops this year, next year and fifty years from now, without depletion or exhaustion of the soil, will be the best farmer.

A knowledge of law, of medicine, of divinity, or of mechanics, will not suffice. It must be knowledge that can be brought home and applied directly to the problems of the farm, and if one has not such knowledge, he is not a farmer, and not qualified for the business of farming.

I can speak from experience. It was my good fortune to receive a collegiate education. I studied Latin, Greek, algebra, geometry, trigonometry, literature, philosophy, astronomy and a whole lot of other things which I do not now recall. Later it fell to my lot to take charge of some farms in Illinois, and during my early farming career I had occasion to purchase a couple of cribs or rail pens of corn. I went out and measured those pens of corn with all of the confidence imaginable. Was I not a college graduate, and had I not studied arithmetic and the higher mathematics? Measuring the cribs and computing the amount of corn was easy—a mere nothing. To prove the correctness of my work when the corn was hauled to town I weighed it, and to my infinite disgust it was one hundred bushels short. That was a time when education did not count. I afterwards learned that the trouble was not with my figures, but with my lack of knowledge about corn. In all my studies there was not one word about common, every-day corn. A long slender ear with shallow grains and wide open spaces between the rows did not attract my attention, and meant nothing to me. Much may be learned by experience, but it is expensive, and in the end may lead to wrong conclusions.

The average farm boy who has only received the ordinary common school education and been kept at hard work upon the farm cannot be expected to know or appreciate the advantages of an education even as it relates to the farm.

It is said that the elements of success are in every individual, but to evolve these elements is the work of the teacher. In this case there is no teacher, and it is sad to contemplate that many boys with naturally bright minds, are growing up into common-place and non-progressive men, for the want of something to arouse and start them in the right direction.

I believe our State Farmers Institute is unmindful of its greatest obligation when it fails to evolve plans that will seek out every farm boy in Illinois and make an effort to encourage and enthuse him with the idea of acquiring a thorough and practical knowledge of the farm and of becoming a progressive spirit and leader among farmers.

There are thousands of such boys, who, if left to the natural course of events will never amount to anything, even if they do not degenerate and go wrong entirely, but who, if approached by the right influences before it is too late, will make capable farmers and most useful citizens.

I have felt this neglect of the boys as I have visited various county institutes in the state and been called upon to attempt to preach the gospel of good farming to aged sinners alone, and with a very slight prospect of conversion at that.

It is all wrong for this organization, having for its object the dissemination of scientific knowledge for the benefit of the agriculture of the state, to direct its attention so exclusively to the men who are about to pass off the stage of action, and permit the boy to grow up under the same conditions and influences and make the same mistakes that his father did.

Why not begin with the boy, whose habits and methods are not yet fixed, and who can be far more easily influenced than his father. Enthuse him with an ambition to excel, and in your life time and in mine, a change and improvement will be made in the agricultural industry of Illinois that will astonish the world. If left to himself the inspiration or desire to improve his condition and to excel may never come to him.

It was similar thoughts and reasoning that led to the idea of the Boys' Encampment as a means for influencing and educating the farm boys for their life work.

This morning I received a letter addressed to me and dated at Chicago, Feb. 9th, 1908, which reads as follows: "In the papers, Farmers Institute reports and various sources, I have learned of your fine work for the boys.

I have a boy 15½ years old, city bred, but with myself and wife there is a desire and purpose to get out. My idea is that if it would be possible for him to attend your encampment with a purpose to learn, that he would get the right impressions of the farm and its responsibilities and possibilities, that lasting impressions would be obtained resulting in a purpose to be something more than a mere drudge. I know of course much, nearly all of this, would be Greek to him, but some light would be let in.

While this plan is supposed to be for the benefit of boys in your district, still I wonder if it would not be possible to get my lad in for this coming summer?"

It is the second letter received from Chicago upon the same subject within a week and requesting permission to send another city bred boy to the next encampment.

I do not feel that these encampments are mine. There is no copy-right upon the idea or plan. The only thought and the only hope has been to benefit the boys of Illinois and other states so far as the idea may be taken up, and especially the farm boys who are in many respects isolated and cut off from many of those advantages that might tend to influence them for better things.

It has been my purpose to test the plan with the hope that, if found feasible, it would be taken up and carried on by others. The plan for reaching out after the boys in an attempt to make reasoning, thinking and capable men of them, has not been perfected, but enough has already been developed to demonstrate that the possibilities of the plan are almost limitless.

It is but a question of means to an end. The farm boys of Illinois can be reached, and in the majority of cases they can be inspired to seek that knowledge which will place them in the front rank of progressive farmers in the next few years.

There is an unlimited demand today for such men. The farm lands of Illinois are rapidly advancing in price and it naturally follows that, in order to make them pay a fair per cent upon the investment, they must be made to yield larger and better crops. The old methods and systems of our fathers will no longer avail.

The products of the farms can be largely increased and in most cases doubled. It is the opportunity of the boys of Illinois. The young man who "can deliver the goods" is the one who will profit by it. I know fields side by side where the crop on one side of the fence is double that on the other, say forty bushels of corn on one side and eighty on the other. At 50 cents per bushel the difference is $20.00 per acre, and in eighty acres it is $1,600.00. Enough to give a boy a four years' course in the College of Agriculture at Champaign.

There are no such openings or opportunities in any business or calling anywhere, as far as my knowledge extends. The boy does not need to leave the farm to make a fortune and a name that will be respected, for the best opportunity in the world is right at home and on the old farm.

Chairman—In introducing Mr. Grout, I neglected to say, that the original momement whereby Ivan Hawk spent two weeks at Champaign, has interested other people all over the State, so that this year the number who were sent out by farmers' institutes was 61, but the 61 so sent carried with them many others, and the whole attendance was 545. Measure if you can, the good effect upon the farming community of having more than five hundred people attend a school at the university, for two weeks, then go back and tell their friends and schoolmates about it. The effect is far-reaching; it is much beyond anything that I can mention.

We will be favored with a duet by Miss Elizabeth Kintzer and Charles S. Burdick.

Duet—Miss Elizabeth Kintzer, Chas. S. Burdick. [Applause.]

Chairman—A bachelor said to a spinster: "Do you really think woman is the equal of man?" The spinster replied: "Well, yes, she is *almost* as bad." [Laughter.] In a book recently published, that comes from the pen of G. Stanley Hall, entitled, "The Young and their Education," or something to that effect, he says:

> "The long battle of Woman and her friends, for equal educational opportunities, is essentially won, all along the line."

While this battle has been won, many people are coming to think that it is not desirable to educate the women and girls in exactly the same way that we educate the boys. When the Woman's Building at Urbana was dedicated, Dr. James ,standing on the platform and looking about the building, said: "What does all this mean?" And he answered his own question by saying, "It means that the fathers and the mothers in Illinois are demanding a different education for their girls from that which they demand for their boys."

Many of us have come to feel that while co-education may be the thing, *identical* co-education perhaps is not the thing. G. Stanley Hall says: "The best training for the young woman is not the college course that has proven unfit for the young man." He further says: "What our schools and other institutions should do is not to obliterate the intellectual differences between men and women, but to make the boys more manly, and the girls more womanly." I am sure we have a lady with us to-day who can tell us exactly how to work out the second part of this proposition, to "make the girls more womanly." I take great pleasure in introducing Mrs. Margaret Mather Romine, who will speak upon the topic, "The Education of the Girl as Related to Her Prospective Life Work." I am wondering how she can figure out what the prospective life work of the girl is. We know what she *wants* it to be, but it does not always happen that way. Ladies and gentlemen, Mrs. Romine. [Applause.]

"THE EDUCATION OF THE GIRL AS RELATED TO HER PROSPECTIVE LIFE WORK."

Mr. Chairman, Ladies and Gentlemen—Do you know, I wonder if that Bachelor was not related to the cynical Cynic who gave a toast to the ladies as, "Once our superiors, but now our equals." [Laughter.] I suppose he may have had the same idea that this bachelor had and this spinster.

Now, Mr. Hall has delegated to me entirely too great a task. I do not assume to know what the prospective life work of all of the girls shall be. I do not assume that the prospective life work of every girl is that of a home maker, but, friends, I do know this: I know that the crying need in our land today, the great problem that is confronting you and me, is how to make the world a home-like place for you men and you women to dwell and to do your life work in, whatever that may be. [Applause.]

The idea of co-education for men and women, it seems to me, has not taken recognition of the fact that a woman's work is just as great as a man's work; that when we decided to have education for women, they were expected to have the same training that men had; and that if the women were educated they must have that same training, there being a superiority in the training that men had. Now, it is possible for women to develop and for them to be well trained and well educated women and not have the same work that men have, and yet it may be just as profitable. What profits it me, friends, if I study along a line for three or four years which will have no possible application to my work? If it happens to be that of a home maker, or if it happens to be that of a stenographer or typewriter, or whatever it may be, the thing that I want is the education that will develop me into a capable, well balanced, self reliant, self respecting woman. Now, if I can have that training along the line of work that develops also my ideals of home life, do you know that I will be a better stenographer, a better physician, a better school teacher, if I have within my heart an ideal of home, although I cannot work it out? If I carry with me the ideal so beautifully expressed by that great teacher of women, Frances Willard, that the mission of the ideal woman is to make the world homelike—if I go out into my life work in whatever line, do you know that I would be a greater success if I fairly enshrine in my heart the thought that part of my mission is to make the world homelike? Why, I saw a little illustration of that just yesterday as I was coming over here. Perhaps some of you have traveled on the Big Four road between here and Indianapolis and you know something of the stations you pass. I had been looking out at the grimy stations, the unclean, cluttered up yards, the dirty platforms, and suddenly we came into view of a little station that had clean windows and that had lines strung up at either end of the sidewalk, and I knew that was the preparation for a growth of vines; that those lines were put there for the vines to grow on next summer, and I know that next summer there will be many weary persons come into that station and wait, who will walk out and enjoy the greenness and verdure of those vines, and it struck me at once that that was an unusual station. Then, as the train pulled out, I noticed there were some white curtains hanging at the window, and I saw a woman's face looking out there, and I knew then that the agent at that place was a woman. [Applause.] Do you not think that woman had in her heart an ideal to make the world more homelike? And she is working it out there, although she is a telegraph operator, or she at least has charge of that station.

Then you would naturally infer that I am assuming that the *life work of woman is to make the world homelike. And that is exactly my belief.* And moreover, friends, I believe that the majority of women go into the homes, and I believe that is in the heart of every girl—now, I see girls here. I know girls, and I love girls, and I know that deeply hidden in their hearts are ideals of home. You may not know anything about it, but I know that that girl is dreaming of the time when she will be in a home, and she has it pictured out in her mind, and if you don't know it, then that is your loss and your misfortune.

If that is the case, friends, then is it not your business to give her the training that will give her a broad idea of what her duties will be in that home?

You say, "Well, I don't want my daughter to be a cook." Your daughter might be worse things than a cook. [Applause.]

Listen! What do you want your daughter to be? Why, you want her to be a self respecting, helpful, capable woman, don't you? That is what education is for. And that is the reason that women are struggling toward this ideal, to help our position and to bring us into more power. Friends, I should not say that just that way, because we have already enough power; it is to bring us into a recognition of our power. And this girl who has in her heart an ideal of home should be taught that if she goes into the home she will be entering into a great partnership.

Any woman who goes into the business of home making with the idea that she is going to escape hard work, that she is getting married for the sake of being taken care of, is a defrauder! Aye, friends, she is worse than that. She is bartering her heart, her womanhood; she is selling her birthright for a mess of pottage. And if she goes into the home life with that view of her position as a woman, it is your fault—you people who had her training and her education in hand, and who ought to have given her a chance to develop that hidden ideal in her heart.

Whether or not she is a housekeeper, whether or not she is a cook, or whether or not she does a particle of work in her home, if she goes into that business, her share in that business is to take care of her home. If she has a half dozen servants, or one servant, or two to do the work, she should be capable of mastering every detail of the work that she expects that servant to do, if she is going to manage her home successfully. Why, would you let your daughter marry a man who was not a successful business man, whatever his work? Why, you require that he shall have certain business traits; that he shall be a success. And who are the successful business men? They are the men who understand to the minutest detail the work they are doing; and that is the business of the housekeeper. The careless woman who does not know about her work, how can she expect to command the respect of her inferior, of the one whom she has employed? Why, they know it the minute you go into the kitchen whether or not you are mistress of the situation. If you are not, then that girl is mistress of the situation, and things are at a pretty bad pass. I know of a woman up here in Chicago who started into her kitchen one day, and she was met in the serving room—in the butler's pantry—by the cook. The cook said: "You will not come in here. I don't want the mistress in the kitchen." Now, if I had been the mistress I would have said: "Very well, you leave this kitchen. I will come into this kitchen when I please. You go out. I don't want you in the kitchen." What did that woman do? She was absolutely at the mercy of that woman because she herself was utterly incapable of taking charge of her kitchen. If she had been capable of taking charge of her kitchen that woman never would have tried such an impertinence as that.

The life work of woman, whatever it may be, should look forward, friends, to the possibility of her going into her own home. I heard some little girls talking once—I have told this story before about the four little girls, but it will bear repeating as an illustration of the different ideals that girls have of careers away from the home life. These little girls, four in number, were talking about what they expected to do, and the oldest one said she was going to be a musician; she was going to Germany to study music; that was her ambition. The second one said, "Well, when I grow up I want to write a book." The third one said, "I hope I will paint a picture some time." Blanche did not state what she expected to be. She was only 7 and very frank. Somebody said, "Blanche, what are you going to be?" She said, "I am not going to be anything. I am going to be married." [Laughter.] But listen. Then this ambitious trio said, "Oh, well, we are, too, after we have done these other things." So that, back of that ambition, is the girlish, unexpressed ideal of home. To be sure, I do not think the ultimate destiny of every woman is to go into the home, and I think we owe untold gratitude to the women who have done a life work for us, who have spent their lives in the service of the public—Frances Willard, at whose name every head ought to be uncovered; Susan B. Anthony, who has helped us to see our duty, our relations as citizens. And listen, friends. What was the ideal back of it in the hearts of those women? Beautiful home life!

Now, what shall constitute this training? Why, of course, domestic science and domestic art. Your daughter has a right to a scientific knowledge concerning the things with which she deals every day. Weren't you absolutely absorbed in these chemical experiments that were being carried on here by Professor Hopkins? Why, you could have sat here the rest of the afternoon and felt well entertained by him. And the very same laws control that come into the life of a woman every time she prepares a meal. These elements that were presented to you are to be found, and they are necessary elements in our food, in maintaining the perfect health of the body. How many women know that? How many women know that we must have potassium, phosphorus and sodium chlorid and lime and all that in our food in order to maintain a perfect ration; in order that we may have healthy, physically strong bodies? And a strong body, I tell you, friends, is a great support for a strong life. Is it worth our while to have all of these things and to think whether or not they are important? Domestic science—you think that means just a cooking school. Oh, no, it doesn't. It means a study of bacteriology. It means a study of chemistry, a study of botany, a study of pyhsics, applied to the preparation of food. Can your daughter take a four years' training of that kind and not be a cultured woman? Why, you think four years of Latin are necessary to give her culture, but you give her four years of scientific training and see if she is not a cultured woman. Then more and more she views life from a different standpoint. Some of my girls in college last year expressed it. They were in the advanced work, they were juniors and they were carrying double work in domestic science. One day the teacher of English, who was dean of women in the college, came over to our department and said: "I have come to visit this department. I should like to know whether I am a teacher of English or an assistant in domestic science." I said: "Why, I am sure I don't know about your position as assistant. I had looked upon you as a teacher of English." She said: "Do you know that those girls of yours, who are in my classes in English, apply every lesson that we have in literature in some way or other to their domestic science work?" Is not that a broad education for a girl? Why, to be sure it is. Then if you are entwining her life about with a love of literature, of art, of music, and making it a part of this ideal of home, can you imagine anything that is more cultured for the daughter than the domestic art? You say: "Well, my daughter does not need to take time to learn washing." Why, do you have your daughter study mathematics? She is not going to solve life problems in mathematics. Probably she doesn't like it, but why do you want her to take it? When I didn't want to take mathematics in college they said, "Well, you *must* take it." I said, "Why do you put that in the course for girls?" Of course I knew we had to have it. The professor said: "Why, it develops your ability, develops your power to think, develops your reasoning power." We study logic for the same reason. But listen. When I came to study sewing, and I had to get a definite idea of the length of the stitch, and to know that certain stitches were an eighth of an inch long and certain other stitches were a fourth of an inch long, I developed the power of observation there that mathematics had not given me. I developed the power of observation and I developed the power of discernment just as definitely as I did from the solving of problems in geometry; and I developed the power to *do* things. When it came to making my garments, I had to make my patterns, to plan that work, and in that way I developed the *power of originality*. Isn't that what you want training and teaching for, in the very lines of work with which we come in contact every day?

Then there is, more than all this, the power that the woman has to establish ideals in her home. I spoke upon that briefly last night. And listen. Do you know that the dignity of labor, the idea of the dignity of labor, the beauty of work, must start in that home? And if that woman who comes into it has not such an ideal enshrined in her heart, in her life work, how can she hope to impress it upon those with whom she is surrounded? If she, in her position as wife and mother, can impress upon her boys and her girls and her husband that honest work enters into the building of character, and that that is a part of the highest principles, the highest ideals of manhood or womanhood, she has done a mighty work toward making the world a desirable, homelike place for us to live in, if that boy can leave her fireside, or that girl can leave her fireside, with the ideal thoroughly impressed upon them that *dishonest work means dishonest principles;* that the boy who takes money for work that he has not done, because nobody was watching him, is just as much of a thief as though he put his hand in your pocket and took your money. I tell you, if we go out into life with such ideals as that we will not have so much trouble with embezzlements or misappropriation of funds. There is the secret of the dishonor and the degradation of labor today, and when we get the labor of the home put on the plane, the dignity of a profession, then we will not degrade labor.

I like the story I heard recently of an old house, standing in one of the New England states. It is now 200 years old, and overhead, cut in the rock, are these words: "This house was built on honor." And then the builder's name was cut in the rock beneath. Do you know, I think that is a wonderful monument to be left to anybody's memory: "This work was done on honor." How many people today are doing their work on honor? How many of us, friends, in the fabric of life that we are building, will leave that epitaph and can look on our life work when we have finished and know that that work was done on honor? That is the education that I would inculcate into the heart and life of every girl, because they have to be where they will work out those things that will be felt throughout the whole land.

You see you may talk all you please about getting a chance to vote. You give them an opportunity to *say* all they please, but you never give them a chance to vote. The chairman says my time is about up.

Delegate—Extend it, please.

Mrs. Romine—But in summing this up, where are we going to do this work? Do you expect to do it in your home? What is the objection to teaching your daughter in your home? There is no objection, if you can do it. But listen. There are more working hours in a girl's life from the time she is 6 to the time she is 18, spent in the public school than are spent with her mother; and moreover, another thing worthy of your consideration is that the study which she learns in a public school has more dignity and more importance for her than the thing that you would teach her in the kitchen. If you teach her in the kitchen, it will be absolutely necessary that you understand the scientific principles that give that thing beauty, life or interest for that girl. Otherwise your work comes to naught. Let her work these things out in school. If she has just one hour a week in the public school she will come home and you cannot keep her out of the kitchen.

I know a little girl over here in Bloomington whose mother said to me—and, by the way, that is the only criticism I ever heard in my life against domestic science in the public schools—this mother said, "I don't believe in domestic science in the public schools." "Why," I said, "Why not?" She said, "Because my little girl is taking domestic science and I can't keep her out of the kitchen." She didn't want to be bothered with her, you know. There is the trouble. It is too much bother; it takes your material; you have got to use up your food stuff. That is all right; that is your business; that is what you want to do. And then again, over in Bloomington I know of the high school girls. You know high school girls have to work pretty hard. At that time domestic science did not come as a course in the high school, but these girls petitioned the teacher to give them extra time. There were fifty-four girls and room for only forty-eight to work. They drew lots, and the six that were left out were to have an opportunity to come into the class at the first case of absence on the part of the forty-eight. One of the six should come in on the absence of one of the forty-eight, and if there were six absent the six should come in. This began in September. When the teacher told me about it it was December, and the six were still waiting. [Laughter and applause.]

Do you pretend to tell me that girls don't care for this training? Do you pretend to tell me that they are frivolous and don't want that sort of training? Why, an educator said that very thing to me, "They are frivolous and don't care." I regarded it as a serious question. I said, "Why aren't you offering the training in your schools, then, that will give women or girls a different view point?" Oh, he did not know the hearts of girls. If he had known he could not have said that.

You just *give your daughter a chance.* Let her have just one hour a week, and it does not make any difference for what you are educating her or what kind of training she is taking, you will find out that the domestic

science work will be the best part, and that she will be just as interested in that as anything you can give her. You will have to drive her to practice her music lessons, probably, but you never have to drive her to practice her domestic science. I thank you. [Applause.]

NOTE—See Miss Bertha La Pointe's report of this address. (Consult index.)

Chairman Hall—I have a very unpleasant duty to perform. The cows are here, the milking machines are here, but through somebody's fault, not the fault of the young man who was sent here to do this work, the machinery could not be got up in time to do that milking this afternoon. So I fear the poor cows must go without milking this afternoon, and will have to wait until tomorrow afternoon at half past four. Instead of the cow milkers, we are going to put on Mr. Burdick to sing "Illinois." [Applause.]

Solo, "Illinois." Encore, "School Days." Charles S. Burdick, Peoria. [Applause.]

Chairman—Several schools were invited here this afternoon. We know that some of them accepted this invitation. We would like to know definitely what ones are here, and if every delegation from a school that is here will see that the fact is made known to Mr. Bill, (sitting at this table) before you leave the room, we will be very much gratified. We hope you will have been benefited and strengthened for your future work by this afternoon's entertainment and instruction. Let every school represented see that Mr. Bill knows about this.

One other matter. We feel quite proud of the fact that so many superintendents of schools are working with us. It is certainly true that in every county where the county superintendent takes hold and works vigorously, we get good institutes. Might I ask every county superintendent of schools who is present to stand. [County superintendents stand.] Miss Bowman, of Macon county; Miss Champion, of Ogle county; Mr. Doeden, of Woodford; I know Mr. Foster, of LaSalle, is here somewhere; Miss Barbara Greyson; Mr. Chas. W. Farr, of Cook; Mr. Holt, of Moultrie; Mr. Perry, of Marshall; Mr. Pruitt, of Sangamon. We are under great obligations to the county superintendents of schools of this State for the progress we are making in the dissemination of agricultural knowledge. I like to recognize that fact whenever I have an opportunity.

Many years ago, it was my privilege to stand for education for useful activity, for work among teachers and among educators. And many of these at that time thought and said, "We want education for education's sake; art for art's sake; music for music's sake; knowledge for knowledge's sake." A few of us thought that we wanted all of those for *humanity's* sake. I am strongly in favor of an education for *doing* things, an education that would prepare men to do useful things, and would make them want to do useful things. A leader in that work is the next speaker. If I have said any good things along this line, it is partly because in my early experience in this State, away back in the 60's, I ran up against William Hawley Smith. I have been running up against him ever since. I never met him and talked with him a half hour but what I got something new to carry to the people. He has consented to come to us this afternoon and to address us upon the subject of education through work; or in other words, "The Educational Value of Work." Ladies and gentlemen, William Hawley Smith. [Applause.]

"THE EDUCATIONAL VALUE OF WORK."

(William Hawley Smith.)

LADIES AND GENTLEMEN—I want to talk to you upon "The Educational Value of Work." And, like a good school teacher, which I always want to be, the first thing to do is to define my terms.

First, then, what do I mean by education?

A leading publishing house in this country once wrote me and told me they would give me $50.00 if I would write them a satisfactory definition of education. Now, I can always use $50.00. [Laughter.] I told them I did not know whether I could write a satisfactory definition or not, but I would try. And I tried.

Things that come to me, that I am fishing for, are apt to come in the night. My wife says to me, if I can get such things when I am asleep, what couldn't I get if I were dead? [Applause and laughter.] So I slept over this definition of education, and early one morning, long before daylight, while I was away out in the wilds of Nebraska, I got this definition. Often times when thinking of anything that way I sleep with a letter pad at the head of my bed, and when the thing comes to me I write it out, sometimes in the dark. You know, when the Lord speaks, you want to say, "Here am I." Because if you don't, He will go away, and he won't come back!

So, early in the morning, way out there, I woke up and I wrote this in the dark:

"Education is development, growth; it is not creation. It can sprout the seed and modify the form; it can increase the quantity and improve the quality. It can help that which comes forth to attain to full and perhaps perfect fruition; but it can never change the kind." [Applause.]

Well, I got up in the morning and I took the manuscript from the head of the bed and I threw it on the bureau in the room of the hotel where I was staying. The bureau was over there, the door was there and the bed was there. (Indicating.)

After breakfast I went out and took a walk, and when I came back the girl that makes the bed in the hotel was in my room making up the bed. I walked right in, and I went right past the bed here and walked over to the bureau, and I saw this manuscript lying where I had left it.

I always like to "try on" my writing of that sort, you know [laughter], so I thought I would read it to the girl and see if she could understand it. She was standing right there by the bed and had a pillow in her hand. I picked my manuscript up and said, "May I read you something?"

The girl looked toward the door. She saw the door was open and that she stood between me and the door [laughter], and she said, "Yes." So then I read: "Education is development, growth; it is not creation. It can sprout the seed," etc.

While I was reading she stood there with the pillow in one hand and the pillow case in the other; and when I got through she said: "That's all right, sir. That is *sinse*. *Anybody* can understand that. I mean, I'm not anybody, but I can understand it." And then she added this. She said:

"I never seen a hen yet could hatch out of an egg any more than was in it whin it was laid!" [Applause.]

I said to the woman: "I will write both definitions, and I will divide the money with you." [Applause.]

Now, when I come to define education, I have got to keep that thing in mind. That woman told it in a homely way, but it is gradually being borne in upon us. President Eliot said it the other day in Chicago and emphasized it. I don't know as he said it quite as well as it might or could be said, but I think he was right; and if he could have been fully understood he would never have been charged with wanting to make classes and not masses.

Education, then, cannot develop all people in the same way, to be the same thing. In determining what education is for the individual, therefore, you have got to go to fundamentals. The first thing to do is to see what kind of an egg you have been hatched out of! [Applause.]

I remember I once was a member of a minstrel company (local) [laughter] and we had a song, the chorus of which went this way:

"Oh, a duck cannot sit on a limb,
For she has no thumbs on her feet;
And a hen, with the fish in the sea cannot swim,
For she hasn't a waterproof seat."

[Applause.]

So, when I define education, first of all I would say, "See what kind of an egg you have been hatched out of."

Now, the next is *educative value.* What do I mean by educative value?

To determine at once what I mean by that, and to illustrate as I go along, I want to tell you a little bit about sympathetic vibration.

If you have a tuning fork—you all know what a tuning fork is—say you have a tuning fork sitting over there tuned to the key of A; and another one sitting over there tuned to the key of A. Do, do, do, do. (Illustrating by striking "A" on the piano.)

Now, leave that fork alone over there. Don't strike it. If it is tuned in harmony with this, that one over there will begin to vibrate with this one when this one is struck; and you could shut this off and that one would go right on *humming,* so you could hear it all over this room. Many of you have seen this. It is called "sympathetic vibration." The Marconi wireless telegraph system is all based, practically, on the same thing.

Suppose I had A, B, C, D, E, F, G over here and A, B, C, D, E, F, G over there. If I strike the "A" over here the "A" over there will vibrate. If I strike the "B" over here the "B" over there will vibrate. Whatever one I strike here the corresponding one will vibrate over there. If I strike all these at once, all those over there will vibrate. They will not get jangled up or mixed up at all. Each one will vibrate in harmony with its mate.

Now, suppose I have a bunch of tuning forks over there and I don't know what they are. Over here I have got A, B ,C, D, E, F, G. I want to find out what is over there. Now, I wish first to develop my "A." I start in on the A here and I want to find out what is over there. I want to develop that thing over there, to educate it. I strike on the A here, but oh! the silence over there—so still you can hear your hair grow. And I hammer away here. I say, "Why don't you vibrate over there?" I pound on my A here; work myself into fever heat, but nothing comes of it over there. Now, what is the matter? *There isn't any A over there at all!* Nothing to respond! Nothing to respond at all!

And I have seen it, good folks; I have seen it time and time again in the school room. When we start in with the education of the children we start in to make them "hum" *somewhere;* and in some things they won't "hum," you know. What do we do? We say they must hum to the A before they can come to the B. That is the idea. Now, if they won't—if they don't respond to the A, for Heaven's sake, let us try the B a little while and see what they will do then; or the C, or anything; and not throw them out, or mark them down, if they don't hum as we want them to, or try to make them!

What study has educative value? I say in answer: *That study has educative value for any individual child that will set that particular child to humming!* [Applause.] That will set that child to humming. That is the only study, the *only* study that has any educative value whatever for that child, that one that he hums to.

It isn't a bit of use to pound your A here into smithereens—pound it all to pieces—when there is no A over there. It won't do the child any good at all. But, dear me! The pounding that I stood as a pupil; and the noises that were made, the discords that were made, in pounding things to make me hum, and I stood there just as if I was dead!

A lady—Miss Smith—from Galesburg sent me yesterday a Latin book to review. I wrote her this morning and said I would be glad to do it if I knew enough. It was a primer Latin book; but upon my word of honor, I can't read the first three pages of it. [Laughter.] And I studied Latin for *four years!* There were no A's there! [Applause continued.]

So, I say with regard to educative value, the only thing that has educational value for the individual is that which the individual will "hum" to.

Now, as to the educative value of work. We didn't use to think that work *had* any educative value. There is a good deal of stuff called work that has no educative or educational value.

They have been talking to you here about farming. If the farmer, instead of working intelligently—if all he knows and does is simply to exercise brute force; if that is all, to drive a team, turn over the sod and stick the seed in somehow—why, I say in that kind of work there is no educative value, or in that kind of a man; not at all, not to amount to anything.

What do I mean by intelligent work? Intelligent work is the expenditure of energy for the purpose of changing conditions or of making new combinations out of old ones, so that the new combinations will be more advantageous to the worker than the old one was. The work that you do must be intelligent to have any educative or educational value.

Now, of course in the early days of the history of the race work did not have that factor at all. There was very little work done, very little work to do. There were very few conditions to change for the primitive man, who lived in a cave; who went almost without clothes, and what few he had were made out of the skins of the beasts; and whose food was taken unprepared, raw—you see there was very small chance for any such thing as intelligent work in those days.

But as time has gone on and as the human race has progressed, don't you see how the necessity has arisen, time and time again, for the changing of conditions that are to conditions that will be more in accord with what we need? First, we get an idea; then we go to work to realize that. We see what we want, then we go to work, taking what we already have, to bring about a combination which shall give us the thing we want to have, in order to attain the desired result.

And right here I want to say a word in appreciation of what the lady told us who stood here (Mrs. Romine) as to the educational value of sewing and cooking. She says that in cooking, a woman ought to know the qualities and properties of the ingredients she uses and what they will do in the processes of the changes they must undergo in being prepared for food. She remarked that a woman, in cooking, ought to know what the results will be. That is all true. I tell you, good folks, what that woman said, standing here, is the *gospel of the new day*, so far as family life is concerned.

I have been going up and down this country for fifteen years, seeking what I might devour. [Laughter.] And I am here to say this, good folks, I am here to say this! I honestly believe that as many men go to perdition every year from *bad cooking* as go from drink. [Applause.]

I know, I know that the drink curse in this nation is terrible, appalling. Sister Carrie Nation took her hatchet and went into many a saloon and did work there in her own peculiar way. [Laughter.] But I have seen more than one kitchen that I would like to see Carrie Nation tackle. [Laughter and applause.] I tell you when a woman mixes up a daub, and makes something she calls bread, and a man eats it, and it goes into his stomach like a lump of lead, I don't wonder that he has to drink whiskey to put him in condition to live at all!

Ladies, do you know—do you know it is just as truly a sin against God to make a bad cup of coffee as it is to swear? [Laughter.] I won't say it is as *bad* a sin, though I could pretty nearly say that. I say it is a sin to take good coffee, good sugar, pure water and rich cream, put them together and cook them up and make swill of the mixture, as many a woman does.

So that is the educative value of work, to do it intelligently. I say it educates a woman to work that way; that is, provided she hums to it. I know there are women who never could learn to make a cup of coffee. I don't blame them; they are not to blame. Not to blame, I say, if I use a phrase some of you know—I say they are "born short" on making coffee; they are practically idiotic on the coffee side, and there you are! [Laughter.] I have seen them. You have seen them. They are not to blame. They are not to be blamed. They simply have no ability in that part of their makeup.

I say, then, in the matter of the educative value of work, you must first be able to form an ideal. You must first see what wants to be done, then deliberately go to work to make the creation of your hand or your head, your brain, whatever you will, fulfill your ideal. That is educative; that is educative.

Of course, with the old method of farming, I am sure my father, who was a farmer, had no ideals. He was a good man and a college graduate; but he had no ideals of farming, not a one. The only method in his day was to get in as much stuff as you could, as quick as you could, and hustle; to get as much off the ground as possible that way, and let it go at that. That was the old idea; that is the old way of farming, and it was far different from the ideals of the present.

You folks who saw these experiments here this afternoon can realize what this means. Of course, Professor Hopkins was just giving you a little taste of it, a little idea of it. But you take this work up, the elements that you had today, your phosphorus and your oxygen and your nitrogen and what-not, and study these things out, as they have to do with farming, and see what comes of it. That was a beautiful thing, wasn't it that the professor showed you—the elements changing from one combination to another; the carbon taken out of the sugar and left in the cup; and the elements changed from a liquid to a solid state, or to a gas, through the change of temperature, or different combinations of elements? All this is suggestive; it gives you an idea. The thing for you to do is to catch on to this idea and apply it in your work on your farms. You know you are losing money by working in the old way. I call this that you have seen educative provided you hum to it. There are those who can and there are those who can't.

Say, did you ever see a bad field of corn?

A Voice—Yes.

Mr. Smith—Of course you did. Did you ever see a good field of corn where the rows were crooked? I never did in my life. Crooked rows, bad corn. Good, straight rows, both ways, good corn. But a man who doesn't know enough to drive a team of horses straight might make a good lecturer, professor, preacher, doctor—I don't know what; but he will never make an educated farmer. And working on a farm will not help him any, or very little at best, unless he hums to it.

I speak with all seriousness, good people, when I tell you that I look with great delight and with great hope on just such demonstrations as these you have just witnessed, where you get the elements together, as did the professor—you saw for yourself—oh, yes, a fine trick, wasn't it? Nothing in the glass! No, nothing in that glass that you can see. Then he pours something into the glass, and then you see what was in it! That mixing up and coming together of the elements there; that making of new combinations is something to marvel at. Such things teach us that all God's laws are sacred; every one of them. If we keep God's laws we get a reward. If we break God's laws we get punishment.

So, I say that, as a means of grace in the matter of work is this matter of getting an idea, then of making the work of your hand tally with that idea. That is educative beyond anything the world has ever yet seen. Of course for each worker the keynote of all this work must be that he be tuned to it.

Dear old Colonel Parker used to talk about the artist and the artisan. The artist, the man who has ideas, and then who works out his ideas as best he can; and the artisan, the man who is paid so much for so much, and who does it almost any old way, just to fill in the time. That is the artisan. The work that you hum to, good folks, the work that you hum to, will make you an artist; the work that you don't hum to, an artisan.

Why, I studied Greek for three years, and I think it may have been profitable! I think it may have been time well spent, although I don't know one Greek letter from another now! But I do remember one thing. (Now, don't think I am saying anything against the study of Latin or Greek. I am not, provided you hum to it, don't you see? That is all.) I studied Greek, and it paid me in a way to work for three years just for one story that I got. That story was that a certain man had a dog and an ass; and the ass always noticed that when the man went out with the dog, the dog would bark and leap upon the master, and for this he was petted and given nice bits of food. So the donkey thought he would "go and do likewise;" and the first time the master led him out, he brayed, and reared up, and struck the master with his feet, and for this he was beaten and sent to the stocks! The artisan is the donkey! The artisan is always the donkey. He sees somebody do something, and he don't vibrate to it at all; but he goes through the motions, and he gets beaten, and sent to the treadmill, always. Always!

So I say about the work on the farm, you farmers' boys, you farmers here, fathers and mothers who have boys and girls—oh I am so anxious to see you have your boys and girls educated on the lines of work to which they will hum. I have seen more than one father go to his wife some morning, and say. "Mother, don't you think we better move to town and give our boys an education, so they won't have to work as hard as we have done?"

Now, I haven't a word to say against moving to town to educate your boys; that is all right; only don't put on that last, "so they won't have to work as hard as we have done." No! No! I have seen such farmers move to town, and bring in a nice, healthy batch of boys, and inside of three or four years every mother's son of them would part their hair in the middle and carry a cane, and walk like a dude! [Applause.]

And I am sorry for them. To the bottom of my soul I am sorry for them. No! No! It's a mistake we have made. We have been fooled. It is not right to educate boys so that they won't have to work.

We have an ideal man in this town, ideal in the matter of work well done. You folks who come here and are strangers in this town, when you walk around, you want to see the sights. I will tell you the greatest sight in this town. You go down Fulton Street, or, if you are on Adams Street, you go down from Main one block on Adams, then turn to the right and go up past Ottenheimer's store, and right back of the alley, the first place you come to is a little shop kept by my old friend Caleb Whittemore. Caleb Whittemore is now past ninety years of age. If you go by there, the chances are you will see the old man, at his work near the front window. He goes to his task, to his bench, every morning, and you will see him there, filing away at a saw. I went in there, the other day, and I said to the old man, "Mr. Whittemore, when you go to heaven, don't you suppose they will have to put up a bench and let you file saws before you will be really happy?"

The old man stopped a minute and then said, "Mr. Smith, I don't know much about heaven, one way or the other, but if you could ever get me anywhere, where I could recollect a job that I had done, that I hadn't made the very best possible out of it, all things and all the circumstances being taken into account—if you could make me think of a job like that, I don't know, wherever I might be, you would have to take me back and let me make that job all right before I would be really happy." [Applause.] That old man don't have to die to go to heaven. He lives it, right along, every day.

I was in there the other day and an advertising man came in. He said, "Mr. Whittemore?"

The old man said, "Yes!"

He said, "I have got a line of advertising, Mr. Whittemore, I would like to show you."

The old man said, "Look around the shop and see if you see anybody idle."

"Oh, well, now, Mr. Whittemore," the man said, "you are an enterprising man; you want to advertise, of course, every enterprising man advertises."

The old man knocked the chips out of his file and said, "My young friend, those two old hands of mine have advertised my business in Peoria for over sixty years, and I guess they will hold out as long as I do! Good morning!" [Applause.]

I call that work that has educative value—work that makes a record like that.

The other day a bright little miss came into his shop. She trotted up to him and said, (they mend everything in that shop) she said, "Mr. Whittemore, can you mend this?" showing some broken thing. The old man replied, "My dear miss, I can mend everything in this world but a broken heart; and with the experience that I have had in life, if you would give me a little time, about an hour or two, with that, I could patch it up so well that you couldn't hardly tell the difference!" [Applause.]

Now it is work like this which my old friend does, that has educative value. I do not know a man of my acquaintance whom I take off my hat to quicker than to my old friend, Caleb Whittemore.

But I want you to see, good folks, what I am after in this illustration, namely, that it don't make so very much difference what kind of an egg you are hatched out of, after all, don't you see? A duck is as good as a hen! That is the point.

We have been taught that, if we could only be some great one, this great one or that great one, that we should amount to something. The man who finds out what he can do well in life; the man who finds out, and then who does that; that work will have educative value.

My old friend W. W. Black, who used to be in Champaign, told me this story: He said, over near Champaign, there was an old Irishman over there, a ditch digger. (You would not call that a very high class egg, would you, that hatched out a ditch digger?) But the old man dug ditches so well that they will tell you, over there, the farmers will pay two prices for his laying tile for them, rather than to have an ordinary man do it; and I tell you, what a farmer will pay two prices for is pretty good stuff. [Applause.]

Mr. Black told me that he went out one day to see the old man digging a ditch. He was well on toward eighty; was well-to-do, the children all married and gone; only himself and the old wife left, and Mr. Black said to him, "Why do you dig ditches any longer? You have got money out at interest, you have got a good home, you are an old man, why don't you quit it?"

"Oh," the old man replied, "Mr. Black, I will never quit digging ditches as long as I am able to do a hand's turn."

"Well," said Black, "Why don't you get somebody else to dig the ditches for you, and you lay the tile."

"Oh, Mr. Black," answered the old man, " I can't find any one who will dig a ditch to suit me. "Sure," he went on, "there is ever so much more in ditch digging than just to throw dirt out of a hole!"

Artist! Artist, Good folks, and not artisan! "There is ever so much more in digging ditches than just throwing mud out of a hole!"

"Well," said Mr. Black, "you have got to be very careful in laying each tile? Must every one be in perfect line? Water will go through that, won't it, without having to be so careful as that about laying every tile?"

And the old man replied, "The water might go through in a way, but it wouldn't go through the *right* way, sor. Mister Black, when I go home at night and lie down on my bed, I do think I can see the water going through ivery tile thot iver I laid; and if I could moind ony place where the wather would be clogged, through any fault of mine, sure an' I couldn't shlape well; and I always like to shlape well, sor, *so I lays them right ivery time.*"

Hats off, ladies and gentlemen! Hats off.

The *artist* is a great man. A man whose work has educated him so that he can make the work of his hands conform to the ideal.

Well, I must not trespass upon your time, for the milking machine is waiting. But there is an old story of a Saint Simeon Stylites, who stood up on top of a pillar until he became like the pillar himself, and they called him a Saint. That is not the saint for me. No, not by a great deal. I saw, in Chicago, the other day, a man on top of a post there, guarding the way across the railroad tracks, and throwing the gates so that the people might pass safely, and that there should be no accident to them. I thought, "There is the Saint Simeon for me." The man stands there guarding the lives of his fellows, and doing work that is in harmony with God's law. That is good work, that is educative, that has value; educational value—that is the work that counts.

In closing I will just stop to say this:

The purpose of education is the formation of character. I guess we will all agree on that. The purpose of education is the formation of character. And in the formation of individual character, that man, or that woman has character, (and only such) who, when they have anything to do, their chief desire is to find out the laws by which the deeds can be perfectly done; and then, having found out what those laws are, who will make their action correspond to laws, just as closely as possible. That is the purpose of education. And work that yields such results has educative value—such work, and such only.

I can not do any better than to sum up with a little thing I heard the other night, from Sam Walter Foss, of Boston:

Two farmers were talking together, and one says to the other:

"What's all this thing about?" Says he.
"Well, I don't know," says I.
"What good is all this world to me,
"This land, and sea, and sky?"
"It's the same old thing, get up and dress,
"And eat, and work like sin;
"And then go to bed, get up, and dress,
"And eat, and work again—
"What's all this thing about?" Says he.
Says I, "I can't tell you, John."
"But as for me, I like to see,
"Just to see the thing go on."

"There aint no end to this machine;
"And no man, here about,
"So far as I have ever seen,
"Can tell what it grinds out.
"It's belts are hitched to far-off gears,
"Way out beyond the sun,
"And I've no doubt 'twill run for years,
"Just like it's always done."
"But what's it all about?" Says he.
Says I, "I can't tell you, John."
"But as for me, I like to see,
"Just to see the thing go on."

"It's day and night, and night and day,
"The same old thing," says John.
"I guess it is," says I, "But, say!
"Let's watch the thing go on!
"For all the grass, and things that grow,
"And stars, it seems to me,
"Is just a free-for nothing show,
"For us dead-heads to see.
"And I aint tired of it, yet;
"It's pretty middlin', John,
"And as for me, I like to see,
"Just to see the thing go on."

"I like to see the thing, my friend,
"It's healthy sport for man,
"Though I can't tell you where 'twill end,
"Nor where the thing began.
"What's all the thing about? Don't know!
"It's fun enough for me,
"To just lay back and see the show,
"And wonder, yes sir—see!
"And so I guess that we are here,
"And it's our business, John,
"To work and get ourselves in gear,
"To help the thing go on."

I thank you, ladies and gentlemen. [Applause.]

Chairman—There will be some good music this evening, and two addresses in which I am sure you will be interested. All are invited to come back for the evening session.

Adjourned.

WEDNESDAY EVENING SESSION, FEBRUARY 12, 1908.

COLISEUM BUILDING.

Hon. Gerard T. Smith, City Supt. of Schools, of Peoria, Presiding:

Music—The Bradley Symphony Orchestra of the Bradley Polytechnic Institute, Harold Plowe, Director.

Chairman—Ladies and gentlemen, I have attended a great many educational conventions, in this State and others, but I doubt if I have at any time, in the State of Illinois or any other, attended a convention that was more thoroughly educational in every sense of the term than is this convention which we are attending at this time under the name of the Farmers' Institute of Illinois, and I am sure that we are impressed with the oneness of purpose and aim of the industrial and educational institutions, as we scan this program, as we note these subjects, and especially as we see the personnel of the speakers, those who have spoken in this convention and those who are to speak, I believe we have no better representatives of the broader view of education than we had upon our program this morning, and I am very much pleased to introduce, as the first speaker of the evening, Professor Blair, who will address you briefly in introducing Dean Kinley, of the University of Illinois.

Ladies and gentlemen, Professor Blair, of the University of Illinois. [Applause.]

PROFESSOR BLAIR.

Introducing Dean Kinley, of the University of Illinois.

MR. CHAIRMAN, LADIES AND GENTLEMEN—At this morning's session of the Institute it was my honor to convey to you a message from your own Dean Davenport, Director of the Agricultural Experiment Station of the University of Illinois. The message which Dean Davenport had for you had to do with the development of the natural resources of Illinois. In that address he endeavored to point out to you that our State revenue is inadequate, that of our total yearly or biennial appropriation of about twenty millions of dollars, fully 48 per cent, or more than nine millions of dollars, went into what he classes as the non-productive industries of the State, while on the other hand, but eight and a half million went into the productive industries of our commonwealth, namely, into the normal schools of the State, and in the universities in the different lines of research. He showed you too, that ten years ago we were putting into our penal institutions, into our insane asylums, 20 per cent of our entire State revenue. At the present time we are paying 23 per cent in this direction. In other words, that while our outlay for the non-productive industries of Illinois is increasing, at an enormous rate, our State revenues are not increasing, or are in-

creasing at less than or approximately one million dollars a year. He pointed out that if we were to develop Illinois, that there was but one sound proposition for us to face, as thinking men and women, and that proposition is this, that for every dollar that we as citizens put down for our insane class, that we put down another dollar for the development of our higher education in the State. In other words, if we are to progress, if we are to make the best of our conditions, if we are to develop our civilization, we must not only recognize the burden which is upon us, and take care of these unfortunates who are depending upon us, but we must also study the problem with regard to increasing the State revenue. He pointed out the fact that most of our State taxes and most of our revenue was raised by direct taxation. Now, the question for us tonight to give our attention to is this: What are the various sources of State revenue? To that question we invite your attention to the speaker who will address you on that subject, who is no less than the Dean of our Graduate School, of the State University and Professor of Economics of the University of Illinois, I have very great pleasure, ladies and gentlemen, in presenting to you to-night, our own Dean Kinley. [Applause.]

"SOME DEFECTS IN OUR REVENUE SYSTEM AND POSSIBLE SOURCES OF STATE REVENUE."

(Dean David Kinley, University of Illinois.)

Mr. Chairman, Ladies and Gentlemen—When your representative came over to our place a while ago, and asked me if I would go on this program and do myself the honor of appearing before you to-night, and told me that President Cook was to be on the program the same evening, I hesitated. Finally we struck up a trade, and I said, "Well, if you will let me speak first, all right, I will do it, because if you let Cook speak first he will have a big house and when he gets through they will all go away and I won't have anybody to talk to, but if you will let me speak first, why, they will stay and hear what I have to say for the privilege and pleasure of hearing him, and that is why, contrary to what you would expect, and contrary to what ought to be the usual procedure in such a case, I am coming before President Cook, tonight.

DEAN DAVID KINLEY.

I used to wonder sometimes, why I had the privilege of appearing so frequently as I have had, before gatherings of farmers. I like to do it. I suppose some of my friends would say it is because I like to talk. I won't deny that, but there are other reasons. I have learned a great deal from these various institutes, farmers meetings of one kind and another that I have had the privilege and honor of attending, but it occurred to me once that there was another reason. I have told some of you what that reason is, but you who have heard it will forgive me for repeating it for the reason I am sure that most of you have not heard why a professor of economics should be called on to speak occasionally at farmers' meetings. Of the subjects in the department of Economics, one branch is the money market. In studying the money market we have to study a good deal of what we call the Wall street bulls and bears. So I conclude that I came in at the live stock end of the Farmers' Institute. [Applause.]

Having found my standing ground I have insisted ever since then that I was entitled to attend this kind of a meeting. Now, I don't know what Dean Davenport's paper contained. I haven't yet had the pleasure of reading it, although I know in a chance way what he intended to say to you. It may be that I shall say to-night some of the things that he has said. It may be that I shall cover in part some of the same ground. If I repeat any of the things that he said to you this morning, then you may rest assured that you may conscientiously and fully believe them because we have both said so. But if I say anything contrary to what was in his paper this morning, why then you will have to believe him—or wait until Dr. Cook speaks and take your choice.

A proposition to raise old taxes or to impose new ones is one that should always be met with close scrutiny. It is an old saying that the power that holds the purse strings controls the policy of the government. Our freedom has been won and without doubt largely maintained because we have insisted that the people shall, in the last analysis, decide how much the government shall raise and spend. It is the business of every citizen, therefore, to inquire as closely as he can or cares to into the income and expenditure of every part of the body politic, and to see to it as far as he can that no money is spent unnecessarily or wastefully.

We always need to be on our guard, however, against confusing parsimony with economy. A tax is not necessarily a good tax because it is small. A small tax the proceeds of which are wasted is a greater burden than a large tax which is spent in such a way as to return benefits to the taxpayers commensurate with that they are called on to pay. Therefore, when we say that a tax is a burden we need to qualify our statement with the idea that the burden may and ought to be lightened by the returns of the expenditure tax. As the students of taxation put the matter, the distribution of taxation is as important a matter for the legislator to consider as is the amount of the taxation. There was a time in some of the older countries when the burden of taxation, taken as a total, was far less than it is today; but it was so distributed that the bulk of the burden fell upon the poor and the ignorant with crushing effect. The same countries today, like England and France, carry a much larger burden of public debt and public expenditure than they did a hundred years ago, because their system of taxation is better adjusted to the backs of those who have to bear it.

Now it is not my intention tonight to try to give you a scientific lecture on the principles of taxation, nor to propose a system of taxation applicable to our own State, nor to defend any particular principle of taxation or method of raising or assessing taxes. It is very clear from Dean Davenport's paper which you listened to in the morning, that something must be done in the near future to increase the amount of revenue which the State has at its disposal for State purposes. The State, of course, is growing. Its needs are growing. Its expenses must grow correspondingly. You cannot have a great state without large expenditures. The greater the state the more numerous and the more burdensome its duties. The larger, therefore, must be its income. Therefore, it is coming to be a burning question in many of our states how to meet the difficulty of constantly growing expenditures and the need of constantly increasing taxation. One thing is certain. We can not go on as we are. Other states which have had systems like ours have felt the pressure of increasing taxation sooner than we and have been obliged to advise some means of increasing state income without increasing the burden of taxation on the individual.

Our system of taxation is one that appeals to the mind at first as eminently just. The basis of it, of course, is the general property tax. That is to say, the basal principle of it is that all property, real and personal, tangible and intangible, should be assessed and pay its share to the support of the government. Now we cannot deny that at first thought, the principle seems an entirely sound one if we assume, to begin with, that property is to be the basis of taxation. If it is there would seem to be no reason why a thousand dollars should not be taxed, irrespective of the form it happens to be in. Yet there is now no principle more generally accepted by students of the subject than that some attention ought to be paid to the source and form of the thousand dollars. For example, if we had a tax on incomes, would it be fair to demand equal taxes from the man who had a thousand dollars income from invested property and from the man who had a thousand dollars income simply from the exercise of his personal skill or ability, like the mechanic or the teacher? The man who has the income from tangible property can pass it on to his heirs if he dies. His income does not die with him. It goes on in perpetuity without any further saving on his part. Not so with the man whose thousand dollars comes from his personal efforts. That income stops when he dies. If his family is to be in the same position as the family of the other man he must save enough during his life to furnish them an income after death. This illustration shows the importance of distinguishing sometimes, as I remarked, between the source and form of taxable property before we can justly say that two people are bearing equal shares of the burden of taxation when they pay equal amounts into the public treasury.

What is it to bear the burden of taxation equally? Is taxation equal when people pay the same sums per hundred dollars? Ten dollars is a very different thing to you and me from what it is to John Pierpont Morgan. To take $10 from him is a very slight burden. To take it from you or me, (especially me) is a much greater one.

It is a fallacy that has found lodgement in the constitution, or statutes of most of our states that uniform taxation is fair taxation; and another fallacy that has found similar lodgement is that we can determine in money the true value of all kinds of property for purposes of taxation. You all doubtless have heard the old story of the Irishman at the fair, who, when asked by a stranger what he should do in case of a scrimmage was told "when you see a head hit it!" Similarly in our tax system, we have, as some critics have put it, followed the same general rule, "when you see a thing tax it."

It is a very simple and childlike proposition that to put a tax upon a certain piece of property is to put a tax upon the owner of that property. The truth of the matter is that in a great many cases the burden of the tax does not rest upon the person by whom it is first paid. He finds means to pass it on to some one else. If you tax houses when the supply of houses is short you are not taxing the landlord, but simply raising the rent of the tenant. If you tax groceries the grocer may simply add the tax, and a little more, to his prices in order that he may make the ordinary profit. You and I and all the rest of the people who rent houses and buy groceries would, in those two cases, under certain conditions, be paying the taxes. Now we have been consoling ourselves all these years, not only in Illinois but elsewhere, that if we tax everything that everybody had we would be treating all alike and would be getting the largest possible revenue. The facts, however, are all the other way.

Here is a statement of the assessed valuation or wealth of the State of Illinois subject to tax for a series of years at intervals of five years:

1873	$1,210,108,863
1878	818,987,409
1883	756,422,291
1888	709,304,506
1893	760,837,855
1898	693,443,706

This shows that the total assessed valuation tends to decrease rather than increase under such a system as ours. Certainly, personal property increases far more rapidly than the amount taxed to us. With such a decrease as shown in the table, either the rate must rise or revenue must decline.

One of the interesting things about the general tax is the variety it is able to show in the value of the same kinds of articles, not only in places far apart but in those near one another. It is interesting to know that in 1905 a horse which had an average value of $9.98 in Cook county for purposes of taxation, ran as high as $18.89 in Logan county. I suppose horses are scarcer in Logan county and there is less demand for them in Cook county on account of the increasing use of automobiles.

We find that of mules and asses in Cook county the average value was $7.95 in 1905, and that there were only 288 of them, but McLean claimed 2249 and is willing to value each of them at $16.54, while Cass county owned up to having 882 at an average value of $18.85; and Jersey county claimed 542 at an average value of $6.93.

The sheep which humbly passed the tax assessor as worth only 75 cents in Cook county, where there were 529, insisted on being valued at $1.08 when he got to Logan county among a group of brethern amounting to 2786. He was worth 67 cents in DuPage and Kane counties, 94 cents in Kendall, 81 cents in Ford, 59 cents in Moultrie, 63 cents in Piatt, 84 cents in Morgan, 46 cents in Alexander, 52 cents in Jackson, 82 cents in Johnson and 60 cents in Clay.

Steam engines including boilers, which were on an average valued at $123.77 in Cook county, were worth, in DuPage only $46.04, in Will $311.43, in Rock Island $204.11, in Peoria $248.72, in Champaign $86.48, in Cumberland $28 and in Pulaski $267.13.

But these gentle peculiarities, laughable as they are, are put to blush by the contrast shown in the varied wealth in different counties held in the form of fire and burglar proof safes. It is very evident that Chicago has no burglars, because it is not necessary there to provide safes of any great value. Of the 3194 assigned to Cook county in the auditor's report of 1906 the average value is $7.61. But in Pike county things are so bad that it is necessary to have safes valuable enough to be assessed at $22.97. The same is true in Putnam, while Iroquois has so many safe-crackers that it has to get safes worth $26.22. The average value of fire and burglar proof safes in different counties for the year 1906 varies all the way from $4.52 to $26.22. The interesting thing about it is that the values are lowest in the counties where the largest cities are. I suppose the better fire proof safes are needed in the smaller places to protect against prairie fires!

It is when we come, however, to consider the assessable value of such things as billiard and pigeon hole tables and similar articles that we see the true wickedness of the rural districts as compared with the large cities, revealed in striking colors. The citizens of Lawrence county push the ivory balls around on a single table for the county valued at $2.00. The virtuous people of Gallatin are willing to acknowledge that their single table is worth $15.00, while Cumberland county acknowledges that its single one is worth $60—all of which differences are very reasonable, possible and proper. But when we find that Cook county has 752 billiard and similar tables, with an average value of $10.84, what shall we think of the comparative wealth of Fayette county which owns up to 5 at an average value of $38? In 6 counties of one tax district the value of these tables runs, $8.46, $10.84, $11.59, $12.86, $12.58, and $13.20. In another, that in which Peoria is included, the value of these tables runs from $7.08, in Marshall county, to $15.83 in Putnam. Please notice that the city of Peoria shows a valuation of such tables to be $8.59.

The citizens of Cook county, according to the same report, own watches and clocks whose average value is $2.70, while the people of Rock Island are wealthy enough to have watches and clocks worth $3.59. In Hamilton county we find them assessed at 72 cents, in Kane at $1.55, McHenry $1.43, Will $1.70. A sewing machine is worth only $2.23 in Chicago for inspection by the assessor. It is worth the same in Knox, but rises to $2.35 in Logan, and falls to $1.71 in the neighboring county of McLean. But the poverty of Chicago is still more strikingly brought out when we look through the assessed value of pianos. The poor people of Chicago are able to own pianos worth only $14.57 a piece for assessment purposes, while the rich farmers of Wabash county are able to have some that are assessed at $36.47, more than 2½ times as much. Clay, Edwards, Hardin, Johnson, Pope, Franklin, Williamson, Moultrie and perhaps a half dozen other counties have their pianos valued at $20 or more.

Cook county had only $84,000 worth of diamonds for assessment in the year spoken of, an amount which would hardly pay for those which we see mentioned in the newspapers once in a while.

It is very evident that the general property tax does not succeed in bringing about equality of burden. It is evident too that the more we need the less, proportionate, at any rate, are we likely to get from a general property tax. This is shown by the fact that with increasing wealth the assessed valuation has not proportionately increased.

The general property tax is obviously, as I say, the principal source of revenue for all purposes, state, county and municipal, and it affords far the largest proportion of the revenues of the State. The tax is based upon an assessment or valuation of property made, as you know, by assessors. The returns for the different places within the county are equalized by the county board of equalization, and are again equalized as between the different counties by the State Board of Equalization.

There are several reasons for inequality in such a system of taxation. In the first place, the assessments are uneven, made as they are by different people from different points of view, and under the pressure of different interests. You and I are required to list our property at its full fair cash value, whatever that may be, and the assessor has to take one fifth of this as the basis of taxation. We are required to list all our property and to put a value on it ourselves. The temptation to omit the things which can not be seen is, not, of course, exceedingly great, but it is an old story that intangible property largely escapes taxation. The consequence is that such a system of taxation, while intended to bear equally upon all kinds of property, really comes to bear most heavily and unjustly upon the owners of real estate and tangible property, and permits with increasing ease and advantage the escape from taxation of all forms of personal property, particularly that which can most easily be concealed.

Now, most men are reasonably honest; but if tax is high or happens to be a little higher than it is somewhere else, the temptation to conceal or transfer this intangible property, where the burden upon it will be lightened, is, for some people, practically irresistible. This fact is seen in the ludicrously low values put upon various kinds of property as I described them a few minutes ago.

In the next place, the general property tax system develops inequalities in the taxation of real estate. There is always pressure on local assessors and taxing boards to assess the local real estate as low as possible, so as to shift to other counties or communities a larger share of the levy for State purposes. The State Board of Equalization, despite its excellent effort, is wholly unable to regulate such inequalities.

In the next place, it shows itself among the owners of personal property, if we attempt to tax it all in its various forms, at a uniform rule and at its monetary value. It is comparatively easy to do this for live stock, farm implements, merchants' and manufacturers' goods, which the assessor can easily find and which can easily have a well known and market value, but it is exceedingly difficult to tell how much money, how many mortgages, how many bonds and what the value is, held by this person or that person, unless he voluntarily admits their ownership. I presume it would be a matter of great surprise to most of us if we could know how many mortgages are unrecorded for the purpose of escaping taxation on them.

Still another inequality is likely to exist, however, as between individual owners of personal property and the owners of some corporate property. For certain classes of corporate property are used in connection with and benefitted by public grants and franchises, yet we are required to value it by uniform rule, by one fixed method, irrespective of its earning capacity. Now a street car, for example, is a very different thing when in use on a street railway from what it is when used, let us say, as a movable restaurant. In the one case it is used in connection with franchises granted by the public. In the other it is not. For purposes of taxation the value is not the same in the two cases.

Again, the present system unduly burdens real estate as compared with personal property. Although it is probably true that in recent years the amount of personal and corporate property aside from real estate has increased by leaps and bounds, the proportion of taxes paid by such property has increased scarcely at all. In the state of Ohio, for example, in 1850 real estate paid seventy-seven and eight tenths per cent of the taxes, and personal property twenty-two and two-tenths per cent. In 1870, real estate paid sixty and seven tenths per cent, and personal property thirty-nine and three tenths per cent; and last year real estate paid sixty-seven and seven tenths per cent, and personal property but thirty-two per cent.

A somewhat similar condition prevails in our own state, although here the percentage of taxes raised from the two sources has changed but little in recent years. The proportion which the assessment of real property bore to the total assessment of Illinois was 78.8 in 1894; in 1895, 80; in 1896, 80; in 1897, 80.1; in 1898, 88.4; in 1899, 78.5; in 1900, 78; in 1901, 77; in 1902, 76; in 1903, 77; in 1904, 79.4 and in 1905, 79.3.

These figures show that real estate has been bearing a slightly increasing burden of tax in recent years, in spite of the vast increase in personal property in the form of securities and otherwise.

The same fact may be brought out in another way. The last United States census gives the true value of real property as $5,468,492,926; of personal and other property (meaning railroads, street railways, telephones, telegraphs, private gas and water works, etc.), $3,348,063,265. The assessed value of the real property, however, was given as $761,039,328 while that of personal property was $326,805,003. The true value of the real property was only sixty-two per cent of the true value of the total, yet the assessment on real property was seventy per cent of the total assessment. In other words, the personal and other property amounted to three-fifths of the value of the real estate and paid less than half the taxes.

We have some figures given by the census for other years from another point of view and it will be interesting to look at them for a moment. In 1850 the estimated true value of all property in the State was $156,265,006. The assessed value was $114,782,645, about 73 per cent of the true valuation. In 1860 the true valuation is given as $871,860,282, whereas the assessed valuation was $389,207,372, or about 45 per cent of the true valuation. In 1870 the true valuation was $2,121,680,579 and the assessed value $482,899,575, or about 23 per cent. In 1880 the true valuation was $3,210,000,000, and the assessed valuation $786,616,394, or about 25 per cent. In 1890 the figures were respectively $5,066,751,719, and $809,682,926 or 16 per cent.

I have not the assessed value for 1900 or 1904 but the true value in 1900 is given as $6,976,476,400, and in 1904 $8,816,556,191. In 1902 the assessed valuation was $1,030,292,435, or about 17 per cent of the true valuation of 1900 and about 12½ per cent of the valuation of 1904.

The tendency shown by these figures is borne out by the statement of taxes paid by the steam railroads in the State. While in many instances the taxes have reasonably increased in the decade between 1892 and 1903, in others they have not increased as much as they should have done. In the case of three important systems there was an actual decrease in the amount paid.

The striking fact from both sets of figures in the above is that the assessed valuation is a rapidly decreasing percentage of the true valuation, showing that the burden of taxation has been becoming lighter, as of course is to be expected and is desirable, but it shows a rapidly increasing taxable strength. The decrease in percentage of the assessed valuation of the true valuation in this State is due to the fact that we have a fetish that the State tax rate must not go above a certain amount; or, as it is sometimes put, that the State expenditures should not increase.

If there is one thing more striking than another in matters of public finance the world over, it is the necessary increase of public expenditure; yet the revenue and expenditure of the State of Illinois have not been keeping pace with its needs.

The significance of all this is further emphasized when one recollects that population has increased very materially, and in one respect we would expect a larger proportion of personal property. Moreover, the infrequent appraisement of real property causes inequality as does also the varying valuation.

If we were to sum up the chief iniquities, as they have been called, that accompany an attempt to tax by uniform rule, in money value, all kinds of property, we would say first that it punishes the honest, rewards the dishonest, sometimes causes double taxation, is unjust to the owners of all other and intangible property and it affects public morals.

Moreover, under it franchises generally escape taxation, corporations are not closely and sometimes not fairly treated, and finally as I have remarked already, on account of the tendency for personal property to disappear from the tax list as population and wealth increase, there is increasing difficulty in raising enough revenue for State purposes.

Now, as I said before, it is not my purpose tonight to lay before you a complete system of taxation. I could not if I wanted to, and you would not want me to if I could. Nor do I intend to commit myself to particular schemes or methods that I wish briefly to put before you as possible sources of increased revenue. It is my intention to show you what has been done in recent years by some other states that have found themselves in the same difficulties that we are. It is desirable to find, if we can, a means of increasing the revenue while increasing the burden of taxation as little as possible; and perhaps making it lighter in some directions, while not making it too heavily felt in others, by a more equitable distribution, more rational methods of raising revenue and by getting, if we can, some of the surplus values, or so-called unearned increment, which without doubt have been and are increasing taxation in various parts of the State. The general property tax has long ago served its purpose. In a community where property was all in evidence and one man owned about the same kind of things that another did it was a simple and easily applied system. Even when there were few stocks and bonds it was simple enough perhaps to tax them in the same way that we tax cattle, lands and other things of the kind. Nor is it a matter of great importance that we did not succeed in securing from public service corporations a fair contribution for the public revenues in return for their franchises by taxing them in the way that we taxed land when this kind of property was of little value and public franchises were few in number and small in importance. That time has gone by, however. The kinds of property are so numerous, the modes in which surplus value and unearned increment are secured are so diverse that the complexity of existing forms of wealth renders the uniform system of taxation wholly inadequate and impracticable if we wish to secure substantial justice. This fact has been recognized already in a number of states. Some are amending their constitutions, some are proposing to do so in order to meet the difficulties that they, like we, are laboring under in this matter of taxation. Practical freedom of taxation now exists in Massachusetts, Maine, Connecticut, New York, Pennsylvania, New Jersey, Wisconsin and Minnesota; while Michigan, Missouri, Washington, California and some other states are discussing the question of constitutional amendment which will enable them to adopt a more rational and scientific system of taxation.

The tendency of thought in most cases in the way of remedy is first the separation of state from local taxation, so far as concerns *sources* of income. Our theory of government in this country contemplates that functions of general character, matters which concern equally all parts of the country, matters in which the interest of no one state is paramount, but are matters of general concern, shall be, speaking in a broad way, functions of the federal government. Similarly, in conformity with the principle, we expect our state governments to concern themselves with those matters which are of general import in the state rather than matters of local interest or responsibility. The separation of sources of revenue for state purposes from local sources of revenue is therefore an adherance to the principle that we have acted on and do not act on generally in our political affairs. The principle of separation implies that the State shall get its income from other sources than a direct levy on real and personal property or individuals. It implies that the counties and cities shall have the right to tax the property that is purely local either in its origin or in its distribution and its defects. The principle of separation of state from local revenue will simply be an application of the principle of home rule in matters of local taxation. It would relieve real estate at once from its whole contribution to the State revenue. It would do away with the constant efforts of different tax districts to avoid paying more than their share of the State tax and would so make equalization between counties and state boards unnecessary.

In the second place, this principle implies that the property which is a source of state taxation shall in turn be exempt from local taxation. The principle of separation of sources of income is not, of course, necessarily a means of lightening taxes. It simply opens the way for better classification of sources of revenue, more equitable assessments and more just distribution of taxes.

Those states that have adopted this principle are now relying on such sources of revenue as inheritance tax, taxes on insurance premiums, franchise tax on corporations, fees and collections by state institutions, and earning of state property and investments, if any, tax on the gross earnings of public service corporations by which are meant railroads, telegraph and telephone companies, and car companies.

The principle of separation of revenue implies that county and local governments shall tax only the real estate and other tangible property within their boundaries. This property is clearly localized and benefits directly and obviously by local government. It is proposed that the State shall get its revenue from those industries and classes of property usually called corporate as distinguished from private and individual property and industries. This property derives its life, of course, from the State. It does not have a local situs in the same sense that a farm does. It may extend over many communities and serve people in a number of different tax districts. The value of the business which such industries carry on in a particular municipality depends more or less on what it does in other municipalites or sections, so that we cannot properly say that this or that part of its value should be assessed here rather than there. Moreover, the taxation of public service corporations cannot be adequately done by local assessors. It is a matter of general concern and should be done by general officers of the State. This is true not only because of the difficulties due to inequalities of assessment, but because the different classes of corporate property cannot fairly or successfully be taxed in the same way.

This assignment of taxes on corporations for purposes of state revenue alone is gradually making its way throughout the country. Pennsylvania has been doing it for many years. New York does the same, as do Connecticut, Ohio and Minnesota, to a greater or less extent.

The proper way to tax corporations is on their gross earnings. At first thought it would seem that the only just basis of taxation is net earnings or income, and theoretically this is true. Practically, however, if a public service corporation is taxed on its net income there will never be any net income. It is always easier to increase salaries and to undertake extensions and improvements and find other ways of using up a surplus than it is to turn it over to the public officers as a tax. The tax on the property of corporations has been everywhere a failure, but tax on the gross earnings, with due recognition of the differences in proportion of net earnings to gross is the only practical way of taxing such corporations with fairness and success. Of course, we must be on our guard against supposing that because a business is incorporated it is therefore a proper subject of greater taxation than if it were not incorporated. We need to be on our guard very vigilantly especially in these days against being unfair to public service corporations. Their conduct, of course, has not been above reproach, their hands are not clean in the public opinion, but that is no reason why we should confiscate their property or make the way of success for them in the future harder than we need to do. No corporation with proper officers will object to reasonable taxation on an equitable basis. In other words, no corporation will object to paying its fair share for the maintenance of government. Moreover, it has been shown by practically every state tax commission, that the substitution of gross earnings taxation under suitable conditions, is the most just method that can be adopted. Such a tax is certain, it is easy to administer, it is adapted to the capacity of the subject taxed, it varies, of course, from year to year, with the gross earnings, but it varies in such a way that it can be computed in advance, since it enters every year in the same proportion. Moreover, such a tax is less likely to be shifted, and it does away with all difficulty about the taxation of franchises.

The comparative advantage of the gross earnings tax as applied to railroads is well shown in our own State by comparing the receipts from the tax on the I. C. R. R. with the tax received from all other railroads in the State. In 1893-4 the Illinois Central paid $727,258 in taxes. In 1901-2 it paid $886,634, an increase of 21 per cent over the preceding years. In 1902-3 it paid $995,579, an increase of 12½ per cent. In 1903-4 it paid $1,085,430, an increase of 9 per cent, making an increase of 49 per cent for the decade.

In 1893-4 all other railroads were assessed at a valuation for tax purposes of $3,733,304. In 1901-2 the assessed valuation was $4,725,332, or an increase of 26 per cent. In 1902-3 the assessed valuation was $4,662,110, a decrease. In 1903-4 it was $4,726,257, an increase of 1½ per cent over the preceding year and an increase for the decade of about 26 per cent, so that at the same rate of taxation there has been a decreasing rate of income.

The same remarks apply, in general, to the taxation of public service corporations other than steam railroads. Street railways, it is urged, are proper subjects for state taxation rather than local, in order that cities may surrender for purposes of state taxation some equivalent for the rolling stock of the steam railroads. While the entire transportation system of the State is given over to state purposes of taxation any attempt to base taxes on gross earnings of such corporations would be inequitable as between the country and city. Still again the close connection between steam and electric railroads and the development of interurban communication gives the city railways even less and less of a local character. These are the arguments put forward by the advocates of the system. I give them to you without comment. Of course it is evident, in the case of street railways, that the old general property tax is very unsatisfactory. The items that enter into the accounts of such corporations make it practically impossible to get a true valuation of the property. The gross earnings tax is peculiarly appropriate, therefore, to street railways as well as to steam railways.

The same is true of express companies. It is commonly supposed that these companies succeed in large measure in bearing their proper share of public burdens. Whether or not that is true, it is certainly true that the general property tax, as applied to the express companies, is entirely inadequate and is inequitable, both from the public point of view and sometimes that of the company itself. The value of the property of an express company in a particular town or city is little or nothing excepting for its relation to the property in other cities and towns. As the court of another state has remarked, "it is the unity of use of the different parts of this scattered property that gives its value to the express company's property." There is no more reason, as Chief Justice Fuller has said, for limiting the valuation of express companies to horses, wagons and furniture, than there is for limiting the valuation of railroads, telegraph and sleeping car companies to roadbed, ties, poles, wires or cars.

Similar remarks apply to the car companies, such as the Pullman Car Company, and the special freight car companies. Telegraph and telephone companies are certainly clear cases of industries of "wide dispersion" which make them peculiarly suitable for state taxation and unsuitable for local taxation.

To summarize briefly the points that I have made:

1. The tendency of tax reform is towards the separation of sources of revenue for state purposes from those for local purposes.

2. The tendency is to assign to the State those sources which are not of a purely local character, such as taxes on corporations, express companies, car companies, etc.; inheritance taxes, fees of state officers and earnings from state property.

3. The assignment of the real estate tax for local purposes, leaving it to each corporate community to make its own assignment and determine its own revenue within the law. In most cases there is a tendency to eliminate personal property from taxation, for the reasons that I have mentioned. If, however, this is not desirable in any particular case, personal property might also be assigned as a source of local revenue. This method would at least get rid of the ludicrous inequalities in the contributions of different communities to the state revenue so far as these contributions are derived from personal property.

It is impossible to present an estimate of the probable income for State purposes in Illinois on the basis of such a program as suggested above. California however, may perhaps serve as an illustration of possibilities in the way of getting revenue under such a system. The California State Commission on taxation, which reported two years ago, submits an estimate of State revenue according to the revised plan, as given in the table below.

Of course the poll tax would not appear in our schedule. It is altogether likely the revenue in Illinois from the sources mentioned would aggregate more than in California.

The schedule is made up on the basis of a four per cent tax on the gross earnings of railroads, car companies, light, heat and power companies; one per cent on the capital stock of banks, which would be excepted from all other taxes; and one per cent of the assessed value of all corporate franchises of every sort not specifically taxed otherwise.

It is to be understood, of course, that this table is simply an illustration of possibilities. In the absence of statistics of the gross earnings of corporations in our State it is impossible to frame up a schedule which would apply exactly to Illinois. If a tax commission were appointed in Illinois one of its duties would be to determine the facts concerning gross earnings, capitalization and other matters which would form the basis of any proposed revision of our system.

Estimate of State Revenues under the Commissioner's Plan.

A. Old revenues retained or only slightly changed:

1.	The poll tax	$ 500,000
2.	The inheritance tax	300,000
3.	Insurance taxes and fees	300,000
4.	Official fees, sundry offices	250,000
5.	Collections by State boards and institutions	225,000
6.	Earnings of State property and investments	1,000,000
		$2,575,000

A. New sources recommended—taxes on:	
1. Railroads, including street railroads	**$3,800,000**
2. Express companies	**120,000**
3. Car companies	**75,000**
4. Telegraph and telephone companies	**210,000**
5. Light, heat and power companies	**600,000**
6. Franchises	**500,000**
7. Banks	**1,500,000**
	$6,805,000
Total	**$9,380,000**
If a liquor tax, as suggested without recommendation, were adopted, it would add $750,000, making	**$10,130,000**
The average State income under the existing system is	**$9,500,000**

Chairman—There is no man in the State of Illinois who is more thoroughly respected by the teachers of this State, or whom they more fully delight to honor than the next speaker upon this program. He has shown the teachers of this State how it may be possible for them to grow, what their chances for growth are, mentally, and in their business, and I am very glad that Doctor Cook is with us tonight, and that you are to have the inspiration of his address, as he shows the farmers of this State how they may grow mentally in their business. Ladies and gentlemen, I want to introduce to you Dr. Cook, President of the Illinois State Normal School, of DeKalb, Illinois.

DR. JOHN W. COOK.

THE FARMERS' CHANCE TO GROW INTELLECTUALLY IN HIS BUSINESS.

(Dr. John W. Cook, DeKalb, Ill.)

Mr. President, Ladies and Gentlemen—We talk to you a great deal. Indeed, as I begin this discussion I am reminded very much of a story that I heard Dr. Hirsch tell the other night in which he relates how he went to a certain city to make an address and in walking about the town found that

his picture was displayed very conspicuously, presumably, he said, for the purpose of attracting people to the lecture, although he didn't quite see how it would have that effect. He crossed the street to go to a drug store—he did not indicate why he went there rather than to the regular place—and discovered his picure hanging on the inside of the glass door and something printed on the glass that came directly across his mouth. Curious to discover the character of the inscription he stooped and read, "Open Day and Night." [Laughter.] I sometimes think that a similar inscription would not be altogether inappropriate across the mouths of some of us who are so constantly talking to the people.

While Dr. Kinley was discussing the eccentricities of our revenue system, as it appears in that extremely humorous publication known as the Report of the State Board of Equalization, I was wondering whether our General Assembly would not indicate a greater degree of interest in the matter of amending the law if our farming communities would press it upon their attention and express a general desire to have the whole system reconstructed in a reasonable and sensible fashion. There seems a singular degree of timidity on the part of the members to attack the question of taxation. I suspect that it arises from a suspicion that the public is sensitive at that particular point and that it may hazard one's political success to deal with the subject in any thorough-going way. But I did not come here to talk to you about financial matters. I half suspect that you would not be disposed to select a schoolmaster to serve you in that capacity.

Nor am I to talk to you about raising corn. I laid by my last crop some forty-five years ago last July. I have had opportunities for extended observations of the sowing of oats, mainly of the wild variety, but I cannot advise our young farmers to engage in that enterprise with any hope of profit. It has devolved upon me for many years to manage a farm, but it has been done at long range and always with the advice and consent of the tenants. The results have been very satisfactory but I have developed no agricultural theories beyond the very simple one that a good tenant is a great blessing.

I began my career in a way that promised a phenomenal success in the hog business. When I was seven years old my father gave me twenty-five cents for the expeditious performance of a somewhat difficult errand. A farmer offered to exchange a very young pig for my fee, the largest amount of money that I had accumulated up to that time. I accepted his proposition, raised the pig without expense to myself, sold it for $8.40 and reserved one of the most promising of its progeny. Number two, a clear gain, subsequently brought me $5.60, making the aggregate returns from my original investment the grand total of $14.00, a net gain of 5,500 per cent. With so remarkable a record I ought to be qualified to give instruction on hog raising. I was so much elated with the result of my experiment that I determined to go into the cattle business, so I put all of my money into a young steer, and thus illustrated the folly of carrying all of my eggs in one basket. But the gods were envious of my good fortune and smote my entire herd with one fell stroke of lightning. In despair I retired from the field and as soon as I was old enough I determined to teach school and have never been able to get out of it. And this is how it is that I am here tonight to talk to you about the school, indoors and out. I am aware that the hour is late and I shall stop if I discover a disposition on the part of any considerable number of you to leave the hall.

My first proposition is that *the chief concern of the race is the education of its youth.* Man is the only being who can think the thought of the world, who can invent a language by which he can formulate that thought under the form of an invariable and serene law, can communicate that law to his fellow and join with him in the utilization of that law for their common welfare. But without the ministry of education he cannot become even a clever animal; with it he may become the master of nature and, in consequence, of his own destiny. No other creature is so supremely helpless at birth and in no other animal is infancy so large a part of the complete span of life. But this weakness is his strength for he begins his career with the fewest handicaps in the form of pre-established tendencies. The field is quite free for education to do its incomparable work. And there are no other years "between the morn of laughter and the night of tears" that are so precious. If you lament the loss of a day in the planting season, when the sky and the earth and the air seem waiting for the seed, do not forget that every day of childhood is a planting season and the lost days will never be relived.

You have read the old story of how the angels sang above the plains of Bethlehem because a baby was born in the night, and I sometimes wonder, as I reflect upon the possibilities of human development, whether the angels are not still filling the night with song when a baby is born, although our dull ears cannot hear the music. As of old the wise men sought the little child with their gold and frankincense and myrrh, so the wise men still seek the little ones to take to them the ministry of education, though they may lie in a manger because there is no room for those who are so humble in the inn. And this is why a hope springs up in the hearts of the world when a baby is born in the night, for he may be a new prophet with a great message for the race. Ninety-nine years ago today, all unheralded, a hero was born in a humble Kentucky cabin, a wonderful gift of God to an enslaved people, and as great a gift to the master race in the hour of its dreadful need. And as every Hebrew mother looked into the face of her new-born child and hopefully wondered whether he might not be the Messiah of whom the prophets had written, so we stand in reverend silence before the little ones, and carry them to the temples and name them with sacramental rites and with the sacred formularies of religion. And then we teach them the lessons of the world that we have learned and of which they are ignorant and without which they are so helpless, and it is thus that we render to them the matchless ministry of life.

And it is because childhood is so precious and education so essential that

SOCIETY SHOULD MAINTAIN AN EDUCATIVE ATTITUDE TOWARD THE YOUNG.

The educative period of life broadly divides itself into two epochs; the unconscious period of childhood and the conscious period of youth or of adult life. The first period is one of tuition, in which the child walks by faith. He cannot see where this tuition is taking him nor does he care. He lives from day to day and is at the mercy of his teachers. And their name is legion. They are not simply the solicitous parents and the skillful tutor, but they are all the elements of the social world with which he comes in contact and all of the forces of nature that beat upon him. The wisdom that he lacks must be given to him by those whose experience enables them to do for him what he would do for himself if he knew himself. At last there comes a time when he can choose the world of knowledge and discipline that he will invade although he cannot be his own teacher. Knowing what he needs he can seek his teacher and can say to him, "I am weak; wisdom would make me strong; teach me." When he has arrived at this stage in his development he is able to take himself in hand and direct his own education. What he shall become is in largest part determined by his own choice.

And it is because childhood and youth are so incomparably precious when subjected to suitable educative influences that society should maintain with the utmost strictness such an attitude toward them. To exploit these years in the interests of pecuniary gain is a crime against nature and humanity. No employer should be permitted to utilize their undeveloped bodies to their hurt and thus arrest the normal processes of growth. The pitiful spectacle of pallid and stunted boys that spend their days on the coal breakers of Pennsylvania mines or their nights in the heat of glass factories or that crowd the sweat shops of great cities, or that are engaged anywhere in other than educative occupations is a menace alike to the mental and physical future of the race. The child-labor laws are the protest of the wiser and more human element of society against the slaughter of the innocents. Both body and mind have certain periods of growth and if the opportunity be denied them at the time that nature has appointed no subsequent attempt at atonement can do more than a partial righting of a cruel wrong. Let us encourage in all proper ways that awakened public opinion which demands the wise conservation of this human energy that is ruthlessly wasted in the fierce battles of industrial competition. While the manufacturers are rejoicing over the disappearing scrap pile and directing all that falls short of the main product into a useful by-product, let us also abolish the scrap pile for boys and girls and reduce the waste of precious human material to the absolute minimum. Let us revive the once over-worked story of the Roman matron who matched her splendid boys, the future Gracchi, against the gems of her proud visitor and declared that they were her jewels. Unfortunate is the child who has no defender of his rights against the neglect of society and the savagery of an industrial order. If the natural protectors of the young betray their solemn trust and withhold from their children the educational opportunities that society freely offers then the strong hand of the law must intervene and secure to those who are unable to protect themselves those inalienable rights that belong to them by virtue of the birthright that comes to every child of a republic.

Let us sound it as a watchword, as a perpetual battle cry, that society must never forget that its fundamental duty toward the young is to see that they shall not be hurried forward into those activities that are productive rather than educative and that swell the wealth of employers at the expense of the innocent and defenceless child. Youth with its plasticity and necessity for growth must be held sacred against the temptation to devote it to any other uses than education. Whatever employment is permitted to engage their attention must be keenly and mercilessly scrutinized from this point of view. If it tends to arrest that development which means an intelligent manhood and womanhood it must be condemned by public opinion and pilloried by the supreme power of the State.

But let us come to an agreement as to the meaning of the term that we so freely use and yet that has so varying a significance.

For the purposes of this discussion education may be defined as the process of persistency increasing the efficiency of the individual, as he comes into contact with life, in those activities that make for the betterment of himself and of the social order.

The value of the individual depends upon his efficiency in useful activities. No others really have any meaning. This limitation should be placed upon the general definition, for life has many aspects and efficiency in some of them may be the greatest detriment conceivable to the general welfare. Let it be understood once for all that all true education is at once essentially moral. It relates to conduct and aims to secure right conduct.

The spirit of the age demands a rigid conservation of energy; it sets the seal of its unqualified condemnation upon waste. It would have nothing of value thrown to the void. Hence the genius of the modern world seeks everywhere for efficiency, for such a contact with life and such a manipulation of its forces and its opportunities that the richest results shall follow the exercises of all legitimate forms of energy.

Efficiency presents two main aspects. They may be characterized as mechanical and spiritual. Mechanical efficiency is that mastery of the details of a process which is acquired by the formation of specific habits. It is the reduction of human activity to the unconsciousness and precision of a machine. It arrests growth in many directions in order that it may secure a high degree of mechanical efficiency in one. It marks the vanishing point of education in the large sense, for education goes on only where there is a genuine effort of the intellect to discover a better method of adjustment; habit removes all sense of intellectual effort, for unerring accuracy and rapidity are to take its place.

There is, of course, a place for mechanical efficiency. There would be no getting on in the world without it. It is one side of every art, from the simplest industrial occupation to the painting of great pictures. As has been indicated, its acquisition demands great industry and large patience. And when one has taken his place in the world as a producer it is essential that he should do at least one thing thoroughly well. It becomes a type of all the things that he may want to do and is thus an ideal, but it also gives him significance and makes him valuable; it is a reason why he should be a member of society. It is possible, however, for the young to be able to do things too well. Such a condition indicates that there has been drill for mechanical efficiency and, possibly, at the expense of a higher and finer efficiency. For this aspect of human development training is a better term than education.

Education is usually regarded as that process through which spiritual efficiency is developed. It is a discipline that enables one to do well what he may never have done before. Its main element is the development of the ability to think, to confront a new situation and deal with it adequately because situations generally can be resolved by thinking.

It is education in this sense that has achieved the liberations that are the distinguishing mark of the modern world. Thought is the solvent of the problems that individuals and nations encounter in their efforts at freer and more efficient living. The attacks upon these problems have two marked consequences; they solve them and thus subserve practical ends, and in the solving they accomplish that educative ministry that can be achieved in no other way.

The characteristic feature of our modern life is the development of the scientific idea and the consequent demand for those who are able to appreciate it.

The spirit of the times is easily discerned. The scientific idea has finally won its way to pre-eminence and is the determining principle of modern life. Science lays down as its fundamental proposition the declaration that the world is rational in its operations and that the laws by which it proceeds are discoverable. If one can but discover the law in the case and will follow its leadings he knows that he is doing the best possible thing. This attitude puts an end to the old method of the rule of thumb. Men will no longer do things in certain ways because they have always been done in that way. It must appear that the law in the case has been discovered and that the method conforms to the demands of that law, for there is a bitter competition in the affairs of life and it is well understood that only he who has found nature's method can hope to hold his own in that hot struggle for the success that men so fondly covet.

This fact makes a new and wonderful demand for education and for a particular kind of education. A phrase has been coined that expresses the demand in clear and unequivocal terms. "Education for social efficiency" is the new watchword of the industrial world and of the educational world as well. A few days ago I attended the session of National Society of Industrial Education, held in Chicago. The manufacturer had left his mill, the railroad superintendent his office, the professor of technology his class room, the statistican his calculations, the labor unionist his shop and the state official specialist his investigations. They came with one common demand on their tongues and that was for more education for the workers of the world. There was present a representative of the Society for Ethical Culture, in New York, pleading for better education for working girls. And there was Professor Graham Taylor, from the Chicago Commons, representing the people who cannot get a hearing for themselves in such a presence. And the eminent Carroll D. Wright, the greatest of statisticans, who knows more about the conditions of the working people than any other living man. And I might go on in the enumeration of great names to your extreme weariness. What is the meaning of such assemblies and of the various educational agencies of which they told us? It means simply that all intelligent men and women are discovering that education in the broadest and most universal sense of the term is the only solution of the social problems that are the occasion of the greatest anxiety to society.

Many significant facts appeared in the discussions that held the platform for two intensely interesting days. One of them was the description of the provisions made by the New York Central Lines for the young men in their shops. They found that they could not depend upon what either private or public enterprise had done in offering schools to meet the educational demand, hence they have taken the matter into their own hands as a measure of wise economical administration and have provided teachers and schools, and their beginners spend a portion of their working hours under the instruction of competent teachers. This is a far cry from the old apprenticeship system where one fitted himself for his craft by the primitive method of imitation. Young men thus prepared for more advanced positions of responsibility move on through the great shops, attacking one department after another, until they have compassed the system and have gained a conception of the process from its beginning to its close.

Nor is this scheme confined to the railway shops of the New York Central lines. Manufacturing establishments have adopted a similar system of preparing their operatives for directive control by the organization of schools of instruction in connection with their great plants. The plan is substantially like that which the State adopted when it began the establishment of normal schools for the education of its teachers. Every exercise in the entire meeting was a brilliant commentary upon the new attitude which society is assuming toward its industrial workers. It is declaring that it can no longer afford to suffer from the extravagance of hiring unskilled employés and that the man who is capable of nothing more than mere muscular labor is the highest priced workman in the mills. A machine is available that can do his work better than he can do it and at a small part of what he must earn to support himself and family.

I listened to these discussions with a burning desire to discover their outcome. The remedy was declared to be the organization of trade schools where boys can go immediately after leaving the grammar school, whose work they ought to be able to complete by the time they are fourteen years of age. Since the industries have no place for them until they are sixteen and since the parents of most of them are unable to keep them in schools longer than is required for the completion of the first eight years there is now a period of two years in which they are obliged to mark time in profitless tasks that contain no educative elements and that may result in positive harm.

WHAT IS THE CHARACTER OF THE EDUCATION THAT THE SCIENTIFIC SPIRIT DEMANDS?

There was one aspect of the discussions to which I have referred that seemed to me to be disheartening. When education for the worker was insisted upon I found myself in the happiest accord with the spirit of the meeting. When the discussion turned upon the character of that education I found myself taking sharp issue with the utterances of the acknowledged leaders and entering a mental protest against their avowed policy. I am well aware that the determination of the education that the young shall receive in a progressive civilization, like our own, is a matter of the gravest difficulty. In non-progressive nations it is simple enough. All that is necessary is to do what has been done from time immemorial. China furnishes the proper type. But we are living in a time when change is the characteristic feature of life. New sciences are developing and new social conditions are appearing and the question that presses for an answer is one that gives us pause: "How do you know but what these young men and young women who are being so carefully educated may soon find themselves in the midst of a set of conditions for which their education has failed to fit them?"

This was the question that urged itself upon my attention when I heard men demanding a set of trade schools that should teach mechanical efficiency and that should shut their doors against what some of them were pleased to call the exploitation of culture. It was clear that what was in the thought of at least a part of that notable assembly was a system of schools whose main purpose should be the training of young men to do certain particular things so skillfully that when the time comes for them to enter the shops they will be ready for a place at the bench or the lathe and will be capable of earning a journeyman's wage from the start. They define education, evidently, as "being onto the job," and of course the industrial system wants that kind of men. But I could not help repeating to myself the general proposition that it is a good thing to be onto the job but it is a better thing to be able to get onto another job if one is thrown out of the employment in which he is engaged.

What is to be the future of the men who from childhood are trained to a life of mechanical employment in a single art and in only one aspect of that art? The possible largeness of a man is to be sacrificed to the production of an industrial utility. Unless the boys are to be equipped with something more than a technique of the shop the trade school will be but an abbreviated apprenticeship through which they will be rushed at our modern express-train speed. It will mean an earlier condemnation to the automatic routine of the mill and to that piece-work which tends to blight the intelligence rather than to cultivate it.

Even this is better, perhaps, than the present method. It is mainly a city problem and one cannot escape the conviction that the two years lying between the close of the grammar school course and the age at which boys are worth something to a business man are crowded with pupils. The work that a boy can get seems to fit him for nothing and may be harmful. As I sat at my luncheon the other day in the great city and reflected upon this interesting and difficult problem a bright lad in the midst of this arid period dropped into the seat opposite and ordered his simple mid-day meal. I at once engaged him in conversation and soon discovered that he was an illustration of the class of whom I had just heard so much over at the Art Institute, where the association was in session. In answer to my questions he told me that he was employed in a down-town office where he had been for a year. I discovered that he was running errands and doing odd jobs and waiting to get to be old enough to get genuine employment. There was nothing educative in his work with the possible exception that he was learning to be on time at the office and endure the occasional lashings with Christian fortitude. It would be better for him and his kind to be acquiring the skill that the trade school develops but it would be far better than that for him to be at the same time undergoing the discipline that comes from "exploiting culture," in spite of what the advocates of the purely industrial training may claim for their scheme.

Whatever may be claimed for this theory of education it clearly is not the education that fits one to meet the demands of a scientfic age. Science may be defined as the effort to find "the law in the case." Its fundamental proposition, as has been said, declares that the world is embodied thought and only that education fits one for a place in a scientific environment which cultivates the thinking habit. But that kind of an education is cultural; it develops spiritual efficiency; it inspires steady and constant growth: it hands over to the machine machine work and gives the man directive control of mechanical forces.

I must allow myself still a little space for a brief discussion of the educational principles involved in these two forms of education for the young, namely the technical and the cultural. Lay it down as the most obvious proposition that a technique is developed by the repetition of a series of acts until the process becomes habitual. By the side of this proposition put the further statement that the more frequently a thing is repeated the easier it becomes, and consequently has a diminishing value as educative material, for a sense of resistance and a consequent necessity for effort are indispensable conditions of an educative activity. The same thought is expressed in the statement that habit is the vanishing point of education. If this were not so, to what wonderful skill those who have done the same thing for many years would attain. We all know too well that a certain degree of efficiency is reached and after that there is no change until the period of decadence arrives. It is entirely possible for children to do many things far too well, for such skill can be acquired only by that constant repetition which arrests growth and stops the acquisition of that higher efficiency which continues to increase with the passing years.

If it is the duty of the young to grow, and if society should maintain an educative attitude toward the young, it is clearly its duty to provide the kind of education that will promote growth, and not the kind that will serve mainly to arrest growth in the interests of material production.

I must content myself with this inadequate treatment of this aspect of the general subject of education and turn to

THE FARM AS A SET OF CONDITIONS FAVORABLE TO INTELLECTUAL GROWTH.

Before we can estimate farm life as an intellectual awakener, we need to study briefly the psychology of intellectual growth. Dr. Lloyd Morgan, perhaps the most eminent of modern comparative psychologists, made a long series of studies of animals for the purpose of determining how learning begins and what tends to promote the disposition to continue it. His experiments were chiefly with chicks, as they were easily secured and may be regarded as typical of bird life in general.

He observed that when the young chick walks out of the shell he does not perform a conscious act, for it is the automatic device with which he is equipped by nature that walks him out. Similarly his first effort to secure food is equally automatic; he pecks at an object because certain nerves are stimulated by rays of light that come from that object and the nervous excitement produces muscular action. When the object has come in contact with taste buds in the mouth and has excited a sensation, agreeable or otherwise, there is a mental experience and the soul of the chicken is born. For this sensation awakens desire or aversion and these are registered in the brain and become incentives to repeat the experience. We shall not be far out of the way, I think, if we shall put it down as a fundamental principle that desire is the beginning of the stimulation of the intellect. The intellect may be defined, in a very general way, as a fine device for discovering ways to satisfy desire. If this is so, it will be very clear that desire—or interest, as it may be called—has a large place in the developing life of the chick and also of the young of the human kind. Every one is constantly seeing this fact displayed in the children about him. Desire covets gratification; the intellect exercises its ingenuity in finding ways to do it and by this exercise grows. The more difficulty there is in mastering the situation so that the desire shall be gratified, the more exercise there is and the greatest growth. But where there is difficulty what may be called a problem arises, and it is in the solving of these problems that intellectual education is developed. Problems, then, are the educative material for intellectual growth, and the more of them there are that the growing mind is led to attack the finer will be its development.

We can now see something of the conditions that are necessary to awaken intellectual life and to secure its persistent growth. There must be an abundant supply of problems and there must also be such a desire to try their solution as will keep the mind picking at them. They must be problems that naturally arise out of the needs of the child or they will not awaken his interest and thus enlist his enthusiastic activity.

This educational doctrine has attracted a great deal of attention within the last few years. It is not new, but it seems to have been forgotten. Many people who know very little about the law of human development have allowed themselves to antagonize educational reforms that aimed to put the schools into line with the life of the child. They have talked about school fads and have looked wise and have then practiced innumerable devices to find what kind of treatment is best for a growing calf or colt or pig. If they had really reflected a little they might have discovered that they could learn much about boys and girls by studying pigs and colts and calves.

The things that attract the young are those that appeal to their senses; that they can see and hear and handle and manipulate and use to satisfy their purposes. Moreover, they are especially interested in objects that manifest life and that have wills of their own and that can enter into some sort of companionship with them and that they can direct. This is so obvious that the city schools try to imitate the free life of the country by bringing into their rooms the objects that the country child is familiar with from his earliest years. This can be at best but a poor imitation of country life, which is so rich in giving first-hand acquaintance with the main objects that furnish the mind with a large share of the common ideas. Mark this down as one of the great advantages which the country child enjoys and which it is little short of a calamity for the city child to miss.

All normally constituted children covet occupations that involve physical activity. It is a grave problem for the city family to find employments that are attractive and educative for the young. Realizing this serious limitation upon city life, the schools attempt to do something to relieve the situation. Under the most favorable conditions it seems impossible to avoid a sense of artificiality. I need not say, in this presence, that there is no lack of educative and attractive life on the farm. He is a happy boy who can desert the city in his school vacations and come into immediate and vital touch with nature. He finds no artificiality there, but, instead, the sincere touch of substantial reality. Farmers do not appreciate this significant fact as they should. We are often endeavoring to explain the differences in character between the child of the city and the child of the country and we may find suggestive food for thought in the fact that I have noted.

Add to these considerations one more. The country child lives in a family. Nominally the town child does; but, in fact, he knows but little of the family life of the country child. The occupations of the farm are home occupations. The father is within easy call of the home all of the time. The child is often his companion or at least sees him at his familiar tasks. He has but little association with other children. There may be a loss of real life because of this fact, for working men and women are disposed to take life rather seriously and the young cannot miss this aspect of farm life. I do not overlook the gravity of the rural child and his inclination to the earnestness of real occupations, but he is slowly building a character that will stand for the things of real value, and we cannot tell how profoundly the imagination may be employed behind his mask of seriousness. In brief, the rural child is the companion of his parents in a peculiar sense and thus develops a moral precocity not found in children who meet their parents, especially their fathers, rather incidentally than otherwise. The city boy who characterized his father as "the man who stays around here Sundays" revealed a situation that is unhappily common.

The slightest reflection upon such conditions as I am inventorying brings out the fact that the young child on the farm is filling his mind with images of natural phenomena to which appeals will be made in all of his subsequent life, wherever it may be spent. He is outside of that conventionally organized life of the town, where conduct is arranged under the formulations of set rules. He has his life to himself in large measure, and thus has space for the growth of that individualism which is favorable to intellectual growth in thinking. He is more disposed, therefore, to self initiation and to working things out for himself. It goes without saying that the routine of country life and its conservatism may catch him later. but he has odds in his favor on the start.

And what are some of the possible advantages of the rural school, that extremely valuable auxiliary of the rural home?

As I have indicated, the problem of discovering activities for the town child in the school—activities, I mean, to which he will instinctively respond—is full of difficulties. It is true that we are not so seriously troubled by it as we should be, for it is far easier to drop into a dull formalism and force the child into our moulds and suppress his free spirit by cast iron regulations than it is to meet him face to face and do him simple justice. The fact that parents often offer opposition to the attempts of live teachers to meet the needs of childhood is something of an excuse for the indolent teacher, but the problem is genuinely difficult, and the reformers have been working at it for the last three hundred years in their attempts to work it out. In the rural school the main obstacle is the opposition of the parents themselves, I am disposed to think. There are such old fashioned notions as to what constitutes an education that if the children are not kept at their books the school is regarded as wasting its precious time. I have indicated the first need of the child—a sense environment consisting of natural objects which he can appreciate and which appeal to his sense of need. Open any first reader and study the material upon which the child is to expend his effort in learning how to read. It is country material, real life, natural objects, living things. One of the most interesting contributions of recent years to the educational literature is a study of the minds of city children. They read about cows and pigs and grass and the scores of other objects that are commonplaces to the country child, and thousands of them have never seen a cow or a pig or any grass except the city lawns. It was not strange that many Boston children thought that several cow hides would be needed to make a pair of shoes, for they had only the pictures of cows to form their ideas upon.

This essential sense environment is at hand in the country, but it must be used for educative purposes to get the real good out of it. It is full of thought material and abounds in absorbing problems, and the problem, as has been shown, is the ideal educative material. Indeed, the country school, with all of its peculiar advantages, has much to learn from a slum school, established by philanthropy and managed by teachers who know their problem. One of the most interesting places that I have ever visited is a Jewish training school in one of the poorest quarters of a great city. Every child is the offspring of Russian Jews and three-fourths of the parents are rag pickers. My warmest interest attached to one little chap who manifested unusual enterprise in working out his projects. His interest and enthusiasm were so striking that I remarked especially about him. And then I learned that he had been a chronic truant for years, wearing out the endurance and patience of the attendance officer, as he led him through many a scurrying race in the alleys and byways of the city. At last he found his way into a school where intelligence had planned for him and then he realized that he had come to his own at last. There is scant space here for tracing out the simple details of that school, but it does not forget that children have eyes and hands and the creative instinct and wants that only motor activities can satisfy. You will find it an impossible task to keep the boy of the slums in a school unless he can find something in that school that impresses him as desirable from his point of view. When Abe Polonsky saw that he was at last in a place where he found help in achieving his main purpose in life, it was as hard to get him away as it had previously been to get him in to any school. After all it was himself that he had been running after during all those years of sudden flight when the attendance officer came into his range of vision. And now he was at the outside door in the morning when it was unlocked and the janitor was obliged to drive him away at the close of the day. Once he was so ill that a physician ordered his mother to keep him at home, and she called a schoolmate to carry the message to the master. She wrote it out as well as she could, and lest the boy should lose it she read it to him: "Abe is too sick to go to school. Do not think that he is staying out." Abe heard it, and when his mother had gone to her work he slipped into his clothes and made the short cut for the school. Flushed with the fever and trembling with his weakness and excitement, he presented himself before his good friend, the master, and with broken voice he stammered out: "My mother says I'm too sick to come to school. Don't you believe her." And this was Abe of the alleys, the Bedouin of West Twelfth place, the foe of the school and of the teacher. What had happened to him? He had found a school that was made for him, and he knew it as soon as he saw it.

A child is not so different from a plant after all. The plant is embodied heredity and that determines its general disposition and tendency. But it must have a suitable environment, and if it does not get it will neither start nor will it persist if it should start. Put the seed in the sand and give it a little moisture and warmth and it will do its best with what nature has stored up for it, but when it has exhausted that supply it will perish. The child is also embodied heredity, but he, too, must have a suitable environment if he is to grow. If he does not find what he wants in the school, he will do what the plant cannot do—he will try to find it elsewhere. The rural school has an ideal natural environment. All that it needs is the right kind of a teacher environment and it will be an ideal school.

But I am to speak more particularly of

THE FARM AS A SCHOOL.

The farm is an industrial institution and the tasks that it supplies are real tasks, tasks that make for the good of the world by supplying genuine needs. It demands work and work is the application of energy for the accomplishment of a specific purpose that is set up as an end.

Work is the most earnest and sincere thing in all of the world. It is creative and in it we show our kinship to the divine, for we bring into being that which without us would not be. We touch that which is relatively worthless and a fine utility springs into existence under the magic of our energy. We must respect the object that we would produce; we must hold it sacred against our caprice. We cannot play at planting corn if we would have a harvest; we must perform the real process and we must do it as nature demands. We must find out the law in the case and must give up any inclination that we may have to go elsewhere for direction. And there is no other experience quite like that which one has when he has actually produced a real utility. He may not be conscious of the effect upon his character but it is there and in unmistakable terms.

There is nothing so educative as work; indeed, there is no education of value without it.

In what are known as the ordinary manufacturing industries each worker performs only a single feature of the whole round of activities necessary for the production of the object. He is constantly repeating himself and may not even see the relation of his little contribution to the finished whole. Such work is not educative in any such way as that which makes a complete round of all of the acts involved in creating a utility. And here is one of the striking advantages which the industry of the farm offers to the worker. The corn which he plows today is different tomorrow. There is no piece work in his factory. He and the energy of the earth and the air and the sky are working together to carry the growing plant through the whole cycle of its being. His carelessness at any stage is reflected in every subsequent stage and the same is true of his carefulness and skill. What is true of the plant is equally true of the animal life. It is well said, therefore, that the farm is a laboratory in which one is forever testing the value of what he has previously done.

I have called attention to that troublesome gap in the development of the boy for which the schools have not as yet furnished employment except in the high school. There are no gaps in the life of the farm boy. There are tasks adapted to every year and every weeek in every year. There is opportunity for personal exploit and private ownership and self initiative if the parents are intelligent enough to see the value of such things in the education of the boy and the girl. Do not forget, I beg of you, what I have tried to say about the duty of maintaining an educative attitude toward youth.

The farmer is now more conspicuously at the center of the scientific situation than any other industrial worker. It is in agriculture peculiarly that the most notable advances have been made within recent years. I speak advisedly when I speak of them as notable advances. A permanent system of agriculture is a necessity unless man can find some way of getting along without the productions of the soil. For centuries he has been laying waste the fairest portions of the world. He has left behind him in his ruthless destruction of fertility arid regions that once blossomed as the rose. Whoever teaches the race to conserve the energy of the soil and to reclaim what the ignorance and greed of man have already so threateningly diminished deserves well of his fellows. Who were more to the State that we so proudly declare to be our own than such men as Forbes, and Hopkins, and Davenport, and Burrill? They have learned the subtle speech of nature and can interpret what she is trying to say to the workers in her laboratories.

And it is, because of this marvelous awakening to an understanding of nature that the farmer has surpassing opportunity for that education which comes to a people in the development of a science. Every worker of the land is an assistant in the great experiment station that extends to all regions where man touches plant and animal life in a stimulating way. Gentlemen of the farm, do you believe what I am saying? Are you willing to give to the young that have come to your home and that dwell so fondly in your solicitude and ambitions the chance to enter into this new and wonderful world of scientific knowledge?

It is the duty of everyone to continue his intellectual growth indefinitely. Who shall mark the line at which man shall reluctantly confess that henceforward there is nothing left for him but the dead level of attainment or the descending grade into senility? If one is to continue to grow he must be within an environment that challenges his intelligence, that comes with new problems for his solution and that keeps alive to new conclusions with the widening range of his acquaintance with nature. Who can point to a field of richer truth or one that answers with a quicker reward economically and intellectually than this new science that has developed so tardily out of the oldest sort of which man has any knowledge?

THE FARMER DOES NOT OWN THE LAND.

Gentlemen, you may mistakenly think that you own the land but it is the inalienable right of a greater self than you. I know that you have the title deeds and nobody will contest your ownership with you. But the land belongs to society and to the ages. It was here before you came and it will be here after you are gone. Millions yet unknown must derive their sustenance from it and you have no right to condemn them to the wretchedness of a diminishing return. The fertility of the soil must be maintained not alone for yourselves but indefinitely more for your successors. Scientific agriculture alone will preserve this inestimable boon. The education of the farmer is our only hope. He must learn the law of the land and of the domestic animals upon whose economic production he must depend for so large a part of his prosperity. It is a most interesting situation in which intellectual survival and economic survival go hand in hand and in which the more intelligence there is as an outcome the more liberal the land becomes to those who work with it for humanity.

AND A NEW SCHOOL IS COMING TO THE CHILDREN OF THE FARMER.

All that is here suggested is dependent mainly upon a new school and a new education. The little group of pupils with a single teacher will soon be a thing of the past and we shall wonder why we endured it so long. There is coming to the fine life of the country an organization like that in the more favored centers of population but with a better course of study. It will lack none of the liberalizing features of the older school but it will enrich the life of the young as that never did. Its curriculum will consist in large part of the life about it and it will promote that life and give it meaning and interest in a wonderful way. Then the young will alternate the cultural life of the school with the culture life of the farm, made cultural by the revelations of science. Then the student on the farm may still dwell under the familiar roof and fit himself for the university as many a Scotch lad has done before him. The rural school will be a real social institution instead of a little group of a meager half dozen where enthusiasm and companionship are impossible. It rests with you, ladies and gentlemen, to settle the question as to the time of the advent of this inevitable school. In a truer sense than we have used the familiar expression it will be "the peoples' college." That triumphant democracy of which poet and prophet have sung and spoken awaits some such consummation. Speed the day of its arrival. I thank you. [Applause.]

President Farr—Ladies and gentlemen, I wish to make an announcement. There will be a meeting of the executive commmittee immediately after the adjournment of this meeting, in this room.

Copies of Volume 12, and Bulletin 10, setting forth the plans of the Grout encampment for this summer, will be available in the rear as you pass out.

It is not possible to say that we will have the milking exhibition tomorrow at 12:00 o'clock. It is a very new thing, however, the probabilities are we will have it, but whether we do or not, we will have an exhibition of milk separation, and the milk test tomorrow at 12:00 o'clock.

Adjourned.

THIRD DAY OF THE CONVENTION.

THURSDAY, FEBRUARY 13, 1908, 9:30 A. M.

GENERAL SESSION, COLISEUM BUILDING.

President Charles W. Farr, Presiding.

Chairman—We will call first this morning for the report of th Committee on Resolutions.

Upon the reading of the report by Mr. Grout, each of the resolutions recommended by the committee was separately adopted, by unanimous *viva voce* vote, and said resolutions so adopted, are as follows:

ELEMENTARY AGRICULTURE FOR TEACHERS.

WHEREAS, It is of great importance that the teachers in our public schools should acquaint themselves with the underlying facts of modern agriculture, and

WHEREAS, The few only will make the necessary effort to secure this knowledge until this branch of study is placed upon the list of studies required for certification, and

WHEREAS, We desire to put ourselves on record as favoring such change in the school law as will make it necessary, after January 1, 1910, for all applicants for a teacher's certificate in Illinois to pass examinations in elementary agricultural science; therefore, be it

Resolved, That the Illinois Farmers' Institute in convention assembled, hereby petitions the Educational Commission, appointed by Governor Deneen, to recommend to the General Assembly the enactment of such legislation as will make a knowledge of elementary agriculture necessary for certification as teachers.

FREE TRANSPORTATION OF PUPILS.

Believing that the country child is entitled to equal privileges in the preparation for life's work with the city child, therefore, be it

Resolved, That the Illinois Farmers' Institute favors the enactment of such legislation as will permit the use of public school funds for free transportation of pupils when the same shall be so ordered by a majority vote of the legal voters of a consolidated school district.

STATE HIGHWAY COMMISSION.

WHEREAS, That State Highway Commission is doing educational work of wide value, and carrying on experiments in various kinds of road construction of service to all communities, and

WHEREAS, Its assistance and results of its work have proved that it does save money to the taxpayers by securing improved roads and bridges; therefore, be it

Resolved, That the State Farmers' Institute in convention assembled again heartily commends the methods and work of the State Highway Commission and urges increased coöperation with it on the part of all local road and bridge officials.

THE ROAD DRAG.

WHEREAS, The road drag which has proven wherever fully tried, a marvel in road improvement, and where aided by proper and adjacent farm drainage has gone far to solve the road problem, therefore, be it

Resolved, That we urge the Road Commissioners throughout Illinois to put the road drag in operation and to avail themselves of the law which provides compensation for interested farmers who would not otherwise use and know the wonderful results of this very simple implement.

TAXATION FOR STATE REVENUE.

WHEREAS, The present methods of State taxation are antiquated, unfair and unjust, resulting in the raising of insufficient revenue to properly take care of our State institutions and develop the resources of the State; therefore, be it

Resolved, That the Illinois Farmers' Institute favors a division of all property into two classes, one for the purpose of State revenue, the other for local and municipal taxation.

Resolved, That the Secretary of the Illinois Farmers' Institute be instructed to transmit a copy of this resolution to all members of the General Assembly elected at the next general election.

AMEND THE GAME LAW.

Resolved, That we, the Illinois Farmers' Institute, do hereby request our legislature to so amend the game laws of the State that no quail or prairie chicken may be killed for five (5) years, and that it shall be a misdemeanor, punishable with a fine, for any person to hunt or shoot on the public highways, or on the Sabbath, or on the premises of another without permission from the owner.

PARCEL POST.

Resolved, That we, the Illinois Farmers' Institute, favor the Parcel Post now advocated by the Postmaster General.

Resolved, That the Secretary of the Illinois Farmers' Institute be instructed to transmit a copy of this resolution to the Illinois members of Congress.

THANKS.

Resolved, That we tender to the Commercial Club, the press, and the good citizens of Peoria in general a vote of thanks for all they have done to make the Thirteenth Annual Meeting of the Illinois Farmers' Institute a success.

A. P. GROUT,
A. N. ABBOTT,
A. V. SCHERMERHORN,
Committee.

Chairman—We come this morning, ladies and gentlemen, to the consideration of what seems to me to be a very important subject in the State of Illinois, that is, the question of good roads. We have two speakers who are to take up the subject from different standpoints, and the first one is to tell us something about the relation of the nation to good roads and good highways in the State of Illinois. The arrangement is that the two speakers shall divide the time equally, forty-five minutes each, and this will give us plenty of time to see the cows milked and to see the cream tested. The first speaker of the morning is the Honorable H. H. Gross of Chicago, and it gives me great pleasure to introduce him at this time. Ladies and gentlemen, Mr. Gross.

[Applause.]

THE DUTY OF THE NATION TO THE HIGHWAYS.

MR. CHAIRMAN, LADIES AND GENTLEMEN—The subject upon which we are to speak this morning is one of great importance, though it is one on which we may, perhaps, have a difference of opinion. That is true of all great subjects. We differ upon politics, religion and everything else that is vital, yet I believe that we should all be willing to listen to a fair minded, sincere man who has something to say.

The most impressive thing I remember in connection with the great World's Fair in Chicago was not the magnificent buildings—those triumphs of art and architecture clustered upon the shores of the great lake, in beautiful Jackson park; but down in the city, in the smoke and clamor, in the marts of trade, the meeting of the Congress of Religions, where men from all parts of the world, holding all kinds of religious belief, for the first time in the world's history met in friendly greeting—brother to brother, man to man, recognizing the fatherhood of God and the brotherhood of man. In going into that historic assembly the respective individuals dropped their prejudices and their theology at the door and carried with them inside their religion and good will. So I think we may agree upon some foundational things in regard to the road proposition. I take it that we are a unit upon the proposition that a good road is better than a bad one, and that if we had our preference all roads would be good. It is something that the country unquestionably needs, and perhap the need is greater than any other single need that could be mentioned.

The question is how to get good roads. Many hands make light work, and by this means they have good roads all over Europe, Australia and New Zealand as well. The later countries are newer and poorer than ours, yet they have succeeded where we have failed. They must have found a better plan to get such splendid results. I am going to talk plainly and say what I have in my heart to say; that is, the results of investigation and experience extending over fifteen years. I wish to speak particularly as secretary of the Illinois Farmers' Good Roads League, of which my friend Grout here is president and brother Hall is one of the directors; Mr. Easterly and the others being representative farmers throughout the State. I believe this is the first time in the history of this country that the farmers have combined in a movement for promoting good roads from the farmers' standpoint; that is what we stand for. I am also glad to speak as a special agent of the Department of Agriculture at Washington, but I assure you that I would not be upon this platform today discussing this great question if my heart was not in it. I feel the necessity for good roads perhaps as John Brown felt the necessity of the emancipation of slaves, and I propose to do all I can now and hereafter to solve the problem of good roads as it ought to be solved.

The importance of good roads can hardly be overstated, but in the Mississippi valley the progress toward getting them has been so slow that many people are in despair. We believe, however, that the rainbow of hope will soon open the heavens before we are through and we will find a way to get what we want. We know that the highways are the veins of commerce, as the railways are the arteries; practically everything raised on the farm has to be transported over the roads to the market, and a large part of the manufactured product of the cities must go over them to reach the farm home. Wagon traffic is practically equal to railway traffic, hence the importance of the subject. It seems to me, after careful study, that the backward condition of the whole west—in fact, of the whole country—on the question of highway improvement is due to fudamental misconceptions; looking at it from the wrong angle.

For three hundred years the assumption has been that the country roads belonged to the farmer, and it was his business to improve them and care for them. This belief has been acted upon and an unjust burden for many generations has been borne by the farm property. Some fifteen years ago the discovery was made that the roads are public property; that they belong to the people of the whole State as much as does the State House or the State university. Every man, whether a resident of the city or country, has the same right upon the highways; it comes down to us from the king's highway of England, where the crowned head himself has no more right than the poorest peasant. For the last fifty years the farmers of Illinois and of other states have assumed that the care of the highways was their duty, and they have done it as best they could and have taxed themselves heavily for the purpose. While the roads have been somewhat improved, they are not a great deal better than they used to be.

Voice—You are right.

Mr. Gross—I see men here, like myself, well advanced in life, who remember that before the constitution of 1872 was adopted, townships all over the State voted bonds to help build railroads. Do you remember it?

Voice—That is correct.

Mr. Gross—Yes. Is there any reason why the railroads should not now be taxed to help build wagon roads that help bring freight to them? The United States government uses the highways for rural mail delivery. It owes a duty to the highways. The much talked of parcel post is an absolute impossibility without good roads. Let me say to you, my friends, with all earnestness that as the roads belong to everybody, they are used for the benefit of everybody and everybody profits by them, everybody owes a duty to them, and every one should contribute in proportion as he is benefited by the improvement. Does not that sound reasonable?

Voice—Sure it is.

Mr. Gross—It sems so to me. It is absolutely unfair to expect the farm property of Illinois (less than one-third of the total property of the State) to bear practically all the burden of highway construction and maintenance and all the rest of property escape.

Another misconception is quite general among the farmers; that is, that they pay the bulk of the taxes. In fact, every one naturally feels he is paying more taxes than he ought to. The fact is that the farmers, in proportion to the property they have, pay less taxes than anybody. Brother Hall told me this morning that he bought two pieces of property about two years ago and that he paid $4,000.00 each for them. One was in the city of Aurora and the other in the country, just outside. He said his city taxes were $51.00, while the taxes in the country were $16.00 upon the same investment. Right over here in Champaign the city tax is over 8 per cent, while the tax right in the townships on farm property is from 2 per cent to 3 per cent, and in no case in any of the townships as much as 4 per cent. So that the man owning property in the city of Champaign would pay from two to four times as much taxes as the same amount of property outside.

We sometimes hear the unthinking say that as the farmers use the roads more than anybody else, why should they not pay the bill? They forget that the roads are public property and that everybody is interested in their use. The world's food supply passes over them. Thus we see, when viewed in the proper light, that the highway improvement is a burden that all should help to bear. I say this in the interest of agriculture, in the interest of the community and I say it in the interest of the people generally as a means to secure better conditions and a higher civilization.

Another misconception is that we cannot build hard roads upon black soil in the corn belt. Let me say to you as one having experience and knowing whereof I speak that you can build a hard, durable and permanent road in any county in the State if you will properly drain it. Two things there are necessary: Proper drainage and proper construction. If any of you gentlemen were going to build a barn or any building of importance, you would get an experienced man to draw the plans and an experienced man to take charge of the building of it. To do otherwise would be a waste of money. It takes skill and experience to get the best results. It is very easy to build a poor house with good material if your workmen do not understand their business. What is needed is good material and good work, and in the building of highways, as much as any other thing, skill and experience are needed. Any attempt to do the work without proper engineering supervision is a waste of money. The State of Illinois is especially fortunate in having a very able highway commission, headed by Dr. James of the university, and an exceptionally capable engineer in Mr. A. N. Johnson, who is to follow me upon the platform today. I am glad to say Mr. Johnson is a man who knows his business thoroughly and is ready to help any road district or community to solve the road problem. My suggestion is that you use him liberally.

It is important in doing anything to do it right. The scientific way of doing a thing is simply the right way. So, if you have any permanent roads to build, my suggestion is, call upon the State Highway Commission and let them assist you in doing it. You will save money and get better results and have a road that will cost much less to maintain than if you attempted to build it yourself, not knowing how.

There has been enough money spent upon the highways of Illinois in the last forty years for improvements to have made boulevards of ~~most of~~ them, and investigation shows a large part of the work upon the highways has been done in the fall of the year. Whenever you put a plow into the ground at his season generally you spoil the road instead of benefiting it. Many and many a time I have seen farmers get together and have a good time, plowing up the roads and doing a hundred dollars' worth of damage to work out a fifty dollar road tax. [Applause.] Is it not time to put an end to this idiotic performance?

Another misconception is that we cannot build roads unless the material is at hand, right on the ground, as it were. It is very common for farmers to improve roads if the gravel is by the roadside. If the gravel is not there they feel it is impossible to build the road. Let me say to you there is no county or township in Illinois that could not build good roads today, stone or gravel roads, at less expense than they could build them in Massachusetts, where the stone is to be found everywhere, and even in New York state, where material abounds. The reason for it is that the grading is very much less in Illinois; there are fewer hills to cut down or valleys to fill. The corn belt particularly is fortunatey situated, as south of it lie the great coal fields of Illinois. Hundreds of carloads of coal daily pass north through the corn belt to Chicago and other points and as many empty cars return to the mines to be filled. There are a million carloads of stone along the drainage canal and 1,500 prisoners nearly idle. There is the situation. Work it out. Put these prisoners to cracking the stone by hand and use the stone to build the roads. It can be worked out.

There is another misconception and that is as to the cost of roads. We hear it said by some that the roads can be built for $500.00 a mile and then again that it will cost $18,000.00 to $20,000.00 a mile. I have in my pocket a clipping from a journal in an adjoining county that says it will cost at least $18,000.00 a mile to build the best gravel roads. Why, my friends, you can build a railroad for that. The man does not know what he is talking about. Another man in the same county says that it can be done for $500.00 to $600.00 a mile. I could not do it, and I do not think Mr. Johnson could. The truth lies between these exaggerated extremes.

Here in Peoria county they have been building hard roads for twenty years. I had a talk with Mr. George Murray, who has had much to do with it, and he tells me the roads cost $1,280.00 a mile to $3.500,00. I will say as a general proposition that gravel roads can be built in districts where the gravel is to be found at a cost from $800.00 to $1,200.00 per mile. If the gravel must be shipped thirty, forty or fifty miles, it will add $500.00

to $600.00 extra to cover the cost of transportation. Good macadam roads can be built in the corn belt at a cost of from $2,000.00 to $4,000.00 per mile, depending upon conditions.

A few years ago Mr. Stuyvesant Fish, then president of the Illinois Central road, made a rate from Chicago of 20 to 25 cents a ton for road material throughout the corn belt reached by his lines. In other words, they would haul a ton of rock or gravel 150 miles by rail cheaper than you could one and one-half miles by wagon. The railroads all stand ready to coöperate. They want the highways improved and they will do their full duty. What is wanted is a sensible, workable, practicable plan to get hard roads and distribute the cost over all the property of the State.

The whole question of good roads really is one of taxation. The question you are all asking is: "How much is it going to cost me upon my farm; how much have I got to pay?" That is the question.

Voice—That is the point.

Another Voice—Good. That is what we want to know.

Mr. Gross—Yes, that is the point, and I want to discuss it a little. I propose to show a plan of general coöperation by which we can build a whole lot of roads without a heavy burden upon any one. That is what we want. I am going to talk to you from official figures. These I shall take from the records of the State Board of Equalization and the tax books of the various counties, and ascertain what the taxes will be upon an average 160-acre farm in Illinois under the State aid plan.

If the State should undertake a campaign for good roads, that would mean an expenditure of $50,000,000.00 in ten years, one half being paid by the State from general taxation and the other half by bonds issued by the respective townships to run for ten years at 5 per cent. The assessed valuation of all the property in the State of Illinois is a litle more than $1,250,000,000.00, and on this the tax levy is made. Farm property is a little less than one-third of this. Cook county pays 42 per cent of all the taxes paid in the State, so any State aid plan for highway improvement means that $4.20 of every $10.00 raised by State taxes is paid by Cook county. The assessed valuation of farm lands in Illinois outside of Cook county ranges from $18.00 per acre down to $2.50. The average assessed valuation in Peoria county for a 160-acre farm is $1,920.00; in Champaign county, $2,600.00; in Scott county, where my friend Grout lives, $1,280.00. Examinations will show that the fair average assessed valuation of 160 acres in central Illinois is about $2,000.00 per quarter section.

For the purpose of illustration, I will say to you: Let the State of Illinois spend $5,000,000 a year upon the highways for ten years. Raise one-half by State taxes and this would require an assessment of 2 mills and would produce $2,500,000.00 per year, half the required amount. A 2 mill tax upon the farm in question is exactly $4.00 per year and no more. (I will ask Dr. Hall, who is a famous mathematician, to correct me if I make a mistake.) So the whole amount of State taxes upon the farm to raise $2,500,000.00 is just $4.00, and no more.

Delegate—Cheap enough.

Mr. Gross—If this plan were carried through for the full term of ten years, the farm in question would be called upon to pay a State aid tax of $40.00, and no more. While this farm is paying $4.00 per year, one single corporation in Chicago will be called upon to pay $57,000.00 per year. One gas company in the State would have to pay $19,000.00 per year. The railroads would have to pay over $200,000.00 per year. A number of the large merchants and manufacturers in the city would pay a tax running into a thousand dollars a year and more. The city and the manufacturer depend largely upon farmers for their market and must buy their supplies of the farmer in return. They are dependent upon each other. While the farmers are the backbone of the country, they are not the whole of it. The city is interested in getting produce over the roads and they ought to help pay the bill, and do not object to doing it.

This State tax of 2 mills will produce $25,000,000 in ten years, if there was an increase in the assessed valuation of the property. We must now provide for the other half; that is 25,000,000.00 of dollars raised largely upon farm property. Let us suppose that the residents in a given township get enthusiastic over good roads and decide to go in debt all they possibly can and build as many miles of road as the funds will permit. The constitution says that bonds may be issued to an amount not exceeding 5 per cent of the assessed valuation. What the owner of a farm desires to know is how much of the bond issue will rest upon his farm; what *he has to pay*. The owner of a farm assessed at $2,000.00 would have a lien upon his farm of exactly $100.00, payable $10.00 a year with interest. The average interest is $2.75 per year. Added to the $10.00, makes $12.75 as an average annual tax to pay the bonds and interest. Add to this the $4.00 State aid tax and we have $167.50 as the highest possible tax for road purposes upon the farm in question, or $16.75 per year, and no more. This a little over 10 cents per acre per year, and much of these lands will rent readily from $5.00 to $6.00 per acre per year. Two per cent on the rental will pay the road tax.

If this operation should go on in all the townships of the State, expending the $50,000,000.00 upon the highways, it would give, with the roads already built, from 25,000 to 30,000 miles of first-class macadam and gravel roads, enough to cross every township in the State with two roads north and south and two more east and west, and connect every town and village from Galena to Cairo, and the tax upon the farm in question would be $16.75 per year, and no more.

There never has been a case, so far as I can ascertain, where any community ever began building hard roads that they did not continue to build them, and when they had had experience in building the roads and paying for them more roads were wanted. Those most vigorously opposed to begin with were soon loudest in their demand for increased appropriations. The building of the highways by State aid will relieve farm property of from one-third to one-half the burden.

Let me say a word to you in regard to what bad roads or unimproved roads mean to the people of the middle west. Some of you will remember a few months ago we had a financial unpleasantness. Every banker was trembling in his boots and a panic was at hand. The occasion or one of the principal factors in that lamentable situation was the enormous amount of money required to move the crops. Do you not remember it? Millions upon millions of dollars were sent from New York, Chicago and other places to the interior to move the crops. Why need the crops be moved with such great haste? The answer is: Why, the roads; bad in the winter season when the crops is expensive and uncertain and sometimes impossible. So the fact that the crops must be moved in sixty or ninety days causes a money stringency. The movement ought to extend over eight or nine months.

A voice—Yes, twelve months.

Mr. Gross—Twelve months—that is right. We raise a crop that is supposed to last a year and leave a little something over for the next year, don't we? Now, if this distribution of the farm products was more nearly uniform there would have been little or no stringency in the money market last fall.

Another thing: Every time you ship a bushel of grain to Chicago and put it in a storage warehouse for the year it costs nine cents a bushel to store it. This grain can be stored on the farm at one-fourth the expense. The fact is, the produce should be moved from the point of production to the place of consumption just about as fast as required and not much faster. That is the sensible, economic way.

Delegate—Right you are.

Mr. Gross—The practice of piling up millions on millions of bushels of grain in Chicago, Minneapolis, Duluth, etc., puts the food production of the world in the control of a clique of men who make great fortunes in trafficing with it, putting the price up and down at their pleasure.

Delegate—Right you are.

Mr. Gross—Let me say to you it is my belief, after careful study of the situation that the unnecessary expense in the way the crops are handled is equal to practically 10 per cent of its value. Is that not important? If you could raise 10 per cent more grain on an acre it would be worth while. My friends, if you can save 10 per cent on the cost of marketing on what you do raise, that is worth while, and good roads will help you to do it.

The idea of State aid had its birth some fifteen years ago in New Jersey. There they began the experiment of requiring the State to pay a fair proportion of the cost of highway improvement as the people of the respective townships decided they wished to make. Remember that State aid does not compel any one to build roads. That is left entirely with each township or road district to decide for itself, but in case they decide to build roads it must be done under the supervision of the State Engineer and then the State pays part of the cost of the improvement.

The State aid plan was violently opposed in New Jersey at first, largely by farmers who did not understand it. In two or three years it became popular, grew more and more so and spread to adjoining states, until now every state east of Indiana is building roads by State aid. It is the only plan that has been found to meet the requirements. Fifteen states have already adopted the plan and it has never failed. What is needed in Illinois is a State aid road law to equalize the burden of these improvements.

New York began a state aid appropriation of $50,000 ten years ago. In five years it became so popular that the people by an overwhelming majority voted a constitutional amendment that provided for an expenditure of $50,000,000 in that state alone within ten years for state aid, and this makes it possible to expend $100,000,000 in New York at the rate of $10,000,000 a year.

Pennsylvania began with $150,000 a year and now is expending over $1,000,000 per year. What is true of these states is true in a greater or less degree in other states in the east.

Among other good things done by the present Illinois Highway Commission was the gathering of data in regard to the effect of road conditions and weather upon road traffic. The report of Mr. Johnson shows that the count was made at seventy-two different places in the State of Illinois, just outside of the corporate limits as a rule, in sections where there were hard roads and in others where there were earth roads. An examination of the reports presents some startling figures. Let me refer to a few of them:

On a Clear Lake road leading into Springfield, upon four days in the month of March, average traffic was 65½ vehicles per day. Over the same road in June and July it was 389. The roads were bad in March but the farmers were not busy, yet when the roads were good in the summer the traffic had increased over 600 per cent.

Upon the same days and under the same weather conditions in the city of Peoria, over a hard road, known as the Knoxville road, I think, there were 165 vehicles in March, average, and 145 in June and July.

At Centralia the average for March was 28, as against 187 for June and July.

Does this not mean something? Highway improvement is really the most important public question before the people of the United States today. [Applause.]

I have another suggestion to make: The United States government uses the roads for rural delivery. Why should it not contribute something to the expense? The indirect tax we do not feel. The government is now taxing us for current running expenses about $7 per capita per year. Including the Panama canal and other improvements the tax is about $10 per year for every man, woman and child in the land. The State tax in Illinois is about $1 per person per year. The government has authority, under section 8, article 1 of the Constitution, to establish and maintain post roads and such of the highways as are used for rural delivery are post roads, therefore the government has a right to contribute. It uses the roads and benefits by the use, therefore it should contribute. The highways all over Europe have been largely built by the central government, in fact that has been the plan for 2,000 years, and that is the reason why good roads are so generally found there. The countries of New Zealand and Australia have good roads largely because the central government helped to build them. The United States is the only country, so far as I am able to ascertain, that makes any pretense to civilization, where the central government so absolutely and persistently ignores the question. It spends millions upon improving the waterways but not a dollar for the highways.

Now, what ought the government to do? I believe in submitting a definite plan. The plan I suggest is this: Let the government of the United States issue $200,000,000 of 2 per cent bonds, payable in fifty years, and apply the proceeds toward building the roads. These bonds would be quickly taken by the banks as they would serve as a basis for circulation. The interest on this amount of bonds would be $4,000,000 per year, but there are 80,000,000 of us to pay it, so it is exactly a nickel apiece and no more. [Applause]. The nickel a year pays the interest and two cents more, or seven cents per year will pay the interest and retire the bonds. [Applause]. The government is now taxing us $10 each per year. I say let them add seven cents and give us the roads? What do you say?

Delegates, in chorus—Give us the roads; give us the roads.

Let this $200,000,000 be prorated among the states, one-half on the basis of road mileage and one-half on the basis of population. This would give Illinois about $11,000,000 to be expended upon the highways. I would not have the government build the roads; let the state do it and draw upon the government for its proportion of the cost, say 25 per cent. A tax of seven cents per year would never be felt by anyone. We are paying, as a matter of fact, $1.75 per year to the pension fund; we are spending $1.25 per year on the army and as much more on the navy. Let us spend seven cents on the roads. [Applause.]

If this plan were inaugurated and carried out in connection with the State aid plan earlier mentioned, we could expend over $60,000,000 upon the highways of Illinois in ten years and the cost would not be felt by farm property. Is that not the thing to do?

Chorus—Yes, yes.

Mr. Gross—My friends, the greatest need today is a thorough understanding of the question of good roads, to take up the subject and treat it in a business-like way. For the purpose of helping a campaign of education the Farmers' Good Roads League has been organized, of which Mr. Grout is president. It is our purpose to conduct a campaign of education upon this most important subject and we want you all to help us. [Applause.]

Mr. Staymates—I don't want to ask this gentleman any questions, but I would like two or three minutes to answer some of the statements made on the farmers' view. I know that it is most unreasonable and impertinent for a farmer to discuss this question. Let the exploiters discuss them. My good friend here looks through the car windows and sees our pastures, and that is about as near our affairs as he gets. He is a good fellow, a good gentleman, but I would like just one moment to discuss this question, if I am allowed five minutes.

Mr. Gross—I have no objection to answering the speaker.

Mr. Staymates—I would like to speak a few moments.

President Farr—Yes, I see no objection to the gentleman having five minutes to talk to this body.

Delegate—Bring him up in front.

Delegate—Bring him onto the platform.

Mr. Farr—And turn him loose?

[Mr. Staymates takes the platform.]

Mr. Staymates—Thank the Lord. I have in the past had the cold shoulder on your platform a few times, but it seems I will speak to you today if only for a pitiful five minutes. I am a farmer, and will be one as long as I live. I want to call your attention to one statement this gentleman makes. He says the city owns rights in our roads, and the farmer would take care of them. I am glad he has put the county on the last end of that. You do take care of the roads, you build them. We build them out of our sweat and blood, and those fellows are permitted through our kindness and courtesy to use them. This automobile association and the other manufacturing interests back of this thing don't pay a cent of our road expenses. You could put their taxes under a microscope and you couldn't see them. I am only asking that we who build the roads can have something to say about them. He speaks of bonds. In the name of God! some of you gray-haired men know what the bond business was for the building of the railroads. I don't believe in it. I *do* believe in road improvement, rural road improvement, with all my heart and soul, and while I didn't get quite to the penitentiary, I got next to it—I am in the Legislature. [Laughter]. I have introduced and got passed a bill providing for the drag in this State and other improvements. I am begging our commissioners from one end of the State to the other to get larger levies for rational sensible road improvements.

He says that in the corn belt—God bless the corn belt—I love the soil of it more passionately than Kossuth ever loved his blessed country when he kissed the soil before he left it forever. That also is a false statement, that you can build those roads cheap in the corn belt. You have got to concrete the base. No sane engineer—I don't care a continental who he is—will dare deny it, that you must concrete the base of these roads before you can build them, and this costs. Dr. Baker, of the State University of Illinois, has quoted the sworn reports of the eastern States, and a pile of them, to the effect that these roads, even in Massachusetts, cost from $3,500 to $22,000 a mile, and you will listen to this bosh about their being built for two or three thousand dollars a mile. Great Goodness, there are 1,760 yards in a mile. It costs $1.23 a yard to haul the sand and gravel in Decatur, Ill., in my district where we are building graveled roads. So you can see, you can figure for yourselves, just think a little about the cost.

Give us good roads when we can get them. I have got a resolution in my pocket here, setting forth that these gentlemen have their say and that we have ours, but one of my noble friends on this committee, whom I have been helping to write some of the resolutions, told me it won't do. They won't pass it. The time will come when you will pass it.

He speaks of the great roads of Napoleon. As poor as I am as an agricultural student, I am writing several books on agriculture and also roads. I have traveled from one end of Europe to the other, and I saw the great road built by Napoleon from Strassburg to Paris. What do you think a French engineer told me? Why, said he, "My friend, this road never would have been built in the days of the railroads. It was built for the horrid exigencies of war, to transport the military supplies." There is your Napoleonic roads. You may stop a moment. He speaks of the roads in Switzerland. He would make you believe that everybody was building them there. Why, in the name of Heaven, my fellow citizens, nobody ever heard of them building a soft road there, you couldn't build one there. It would cost you more, it would be more work to build a soft road in Switzerland than it would to build a hard road in the corn belt of Illinois. And yet you are eternally flimflammed with this argument about what the governments of Europe have done. Those roads have been built two thousand years before the dawn of railroads, and are most of them cut through stone. I consider that you ought to go and get a cheap looking-glass and if you want to see a chump, look into it, after listening to rude continued arguments. [Laughter.]

I am not a chump, but I want to tell you one thing, you are risking an awful precedent here, you are allowing a farmer to speak before you. These gentlemen are not farmers. My friend Johnson is a gentleman, but he is an engineer from Massachusetts. He is giving us lots of good information. But State aid, that is ridiculous. Go back to that law that was tried two years ago in the Legislature, providing for the government to build roads at your expense. You will always pay for that expense. They only allow the township $5,000 out of $200,000. That was the maximum appropriation. Not enough, gentlemen, to build a garden path across the State of Illinois. Talk about State aid. But I will say national aid is not to be considered here, for we are in Illinois, and we must make our own improvements, so go home and use the drag, and use it with all your might, build your roads and drag your roads, and grade and drain them.

Delegate—I thank you. . . And don't have them plow up all that green stuff in the spring, and haul it in the middle of the road either, and leave it there. [Applause.]

Mr. Farr—Gentlemen, shall we hear from Mr. Gross for two minutes?

Delegates—Yes. Gross, Gross.

Mr. Gross—I want to say, gentlemen, that the farmers are pretty well represented here by Mr. A. P. Grout, Dr. Hall, Dr. Reynolds, all from the farm, Mr. Black of Quincy, A. H. Saunders, B. F. Wyman, all farmers.

I don't remember saying anything about the roads in Switzerland. But I will tell you this, I am prepared to meet the gentleman any time, anywhere, under any circumstances, in joint discussion on this question, and I know pretty near what the result will be. I met Professor Baker over at Bloomington on a discussion. He quotes Professor Baker. He speaks about the roads of Decatur. They are building roads in his district, in Decatur, think of it. They built nineteen miles of road there seven or eight years ago, Mr. Baker was the engineer, they cost less than $1500 a mile. I got it from the records. [Applause.]

Mr. Staymates—I will state to the gentleman I am glad he has made that offer, but I don't think he will ever make it good.

Mr. Gross—Anybody you like, sir, anywhere.

Mr. Farr—Referee?

[Laughter and applause.]

Mr. Farr—There is nothing on earth like having a definite understanding. I think the gentlemen understand each other now very perfectly. [Applause]. The next subject for our consideration this morning—

Delegate—What we would like to know is, where they are going to meet, so that some of us can be there.

Mr. Farr—They will announce it. There will be a whole lot of fun.

Delegate—Let the farmers hear it.

Delegate—So, Mr. Chairman, I move you that there be a referee appointed, and that they will not hit under the belt, below the belt.

Mr. Farr—It is the spirit of this meeting.

Mr. Staymates—If there is any member of this great body who wants any literature upon the subject from the standpoint of anything I have said, I will be glad to have him send a postal card to my town, and he will get my addresses and articles.

Mr. Farr—The next subject for our consideration this morning is: "The State in its relation to the improvement of the Highways." and the speaker is our State Highway Engineer, Mr. A. N. Johnson. [Applause.]

THE STATE IN ITS RELATION TO THE IMPROVEMENT OF THE HIGHWAYS.

(By A. N. Johnson, State Highway Engineer.)

It has been a general principle of our form of government to leave each community as much independence of action as possible. Beyond having the general method of government prescribed, the local communities have enjoyed, and still do enjoy, great freedom of action in all public matters, restrained only by the regard due the rights of neighboring communities.

The more simple the conditions of the life, and the less frequent the cause and means for communication, the more nearly possible was it for each community to govern itself independent of other communities. As the means of communication improved and increased, the concerns of one community became the concerns of its neighbors, so that for the same reason that man found it necessary to have some of his freedom of action as an individual abridged, it has been found necessary to abridge and control some of the individual powers of local communities for the benefit of all; that is, as our public life becomes more complex, new and additional duties devolve on the central government.

This increase of centralized power arises from both the social and economical needs of the people in all communities, so it happens that we find today all of the states engaged in many activities that were not thought of fifty or a hundred years ago.

But what is the rule by which to decide whether the State should assume new powers and consequently enter upon new relations and undertakings? If our guide be past experience (and that is, perhaps, our best guide), we may fairly decide that a duty devolves upon the State when it appears that by exercising more control over any phase of our public life and public business the State can improve the condition or meet the unfilled wants of the people of the State.

A. N. JOHNSON.

Thus, today we have our state boards of health, which direct and assist the local boards for the mutual protection of different communities and undertake investigations which would be beyond their means. Likewise, many other affairs, which will occur to the minds of all, have become the subject of State legislation and control accordingly.

But, as would be expected from the different conditions, all states have not developed uniformly along the same lines nor found it necessary to undertake control of similar activities. Thus, some states have laws on certain subjects, while other states have no similar laws.

Confining our attention solely to road building, we find that a number of states, including Massachusetts, New Jersey, Connecticut, Rhode Island, New York, Pennsylvania, Maryland, Vermont, New Hampshire, Maine, Ohio, Virginia, Michigan, Minnesota, Missouri, Iowa, Illinois, Wisconsin, California and some others have all passed laws creating state highway departments, the powers of these departments varying all the way from the building and actual control of a system of roads throughout the State—as in the case of Massachusetts—to merely advisory boards, as in the case of Maine, Vermont, Illinois, Minnesota, Iowa and a number of others.

The relation of Illinois as a State to the matter of road building must be considered from the standpoint of present conditions and needs of the people. The fact that the conditions in Illinois are different from those in many other states would doubtless lead to a different conclusion as to what should be undertaken by this State. In contrasting the conditions in Illinois with some of the eastern states which have made large state aid appropriations—for instance, Massachusetts—we find marked differences in the conditions which would be a controlling factor in the system of roads required by each.

In Massachusetts, and also in many of the other eastern states, we find the distance between comparatively large towns and villages to be but from five to ten miles and that the roads connecting these points are used by the people in each town for their entire length, and the travel is comparatively evenly distributed over the whole length of the road.

In Illinois, which is essentially an agricultural State, we find the larger towns and cities separated by considerable distances. Instead of being five or ten miles apart, the distance between them is oftener ten times this. There is today little or no traffic between the larger cities and towns in Illinois; each city or town of any size being a center for a comparatively large region round about, toward which the travel naturally goes, and thus we have no need at present for so-called "through roads.' What is required are radial roads, constructed from the larger centers for such a distance as would serve the people in the vicinity.

In view of these different conditions, it is not logical to draw conclusions from the experience of Massachusetts in its state road building, nor to assume that because the state there has found it beneficial to undertake the construction of roads in all sections and have a large system of state roads, that the same kind of a system is necessarily the proper one to be applied in Illinois.

In order to discuss knowingly what should be the relation of the State to road building, let us consider for a moment present road conditions in Illinois, as found from the study made by the State Highway Commission throughout the State.

Our attention is held first by the administrative system. We see the State divided into some 1,500 road districts and townships, each one of which acts independently of the other and makes such road improvements and in such a manner as each sees fit. In each of these districts there are three commissioners, making a total of 4,500 road officials throughout the State. There are expended under this system approximately five millions of dollars annually, which are raised by the rural tax payers.

It would not be hard to predict what the results would be from a system of this character, where not only do we frequently find different methods in each township, but often in the same township the various commissioners will not follow any systematic plan, and, in fact, have none; the office changing hands too frequently for any definite system to be devised or worked out. This fact, combined with the general demands of most of the tax payers, that each year something be done as near their farm as possible, results in such a thin veneer of attempted improvement over the 95,000 miles of road in this State that over half of these five millions of dollars each year is spent to no really practical purpose; in fact, it is conservative to say that half of it is spent to advantage.

The road system is, however, a most excellent example of local government. It was well adapted, perhaps, to the needs of the early days of the settlement of the country, but the complex conditions of modern life require different treatment. There is a certain amount of road work in keeping up purely local roads, and roads which are not much traveled, that can be well handled by the local communities; but near every large city we find roads that are used by people living at a considerable distance; these roads are used more than any other roads in the vicinity, and to that extent it is proper that a larger amount of money should be expended upon them.

One must be impressed in any study of the present conditions of road work with the relative importance of bridge construction. Nearly one-half of the money raised for road and bridge work is spent upon bridges, so that we find today something over $2,000,000.00 a year spent for this purpose.

The method of letting the bridges is cumbersome and unbusinesslike. One can see more clearly, if possible, the lack of skilled supervision in this part of the work than in the road work proper, although the need of such supervision in both departments is essential. The difference is that as regards bridges the matter is somewhat more serious through the fact that the public safety is concerned. The tax payers have been called upon for large sums of money for bridges and have secured, in general, structures wholly inadequate for the purpose and very often at far too high a cost.

It should be apparent to every one that the first requisite should be to insure to the public bridges absolute safety—bridges that are properly designed and properly built. The next part of the problem should be that these bridges be secured at a reasonable price. It is evident that this cannot be accomplished under the present system.

With a road and bridge system so open to improvement, it would seem entirely proper for the State to have a close relation with the road and bridge construction as now carried on, to the end that the tax payers could secure better results for the money that they now spend.

It was for this purpose that the Forty-fourth General Assembly passed a law creating a State Highway Commission, making it the duty of this commission to advise with local officials throughout the State as to the proper method of road and bridge construction and to investigate and make such experiments as would demonstrate the best methods given conditions require. Such a plan would seem to be the most logical step to take in view of the conditions that exist. The way to take up any problem is to first find out what the essentials of the problem are, and having ascertained them, then to apply the knowledge thus acquired to a solution.

It is not necessary to take the space here to describe in detail the various phases of the work of the commission along these lines. It can be briefly summed up by stating that the State Highway Commission has considered that its work should be so shaped as to demonstrate to the tax payers throughout the State that a very great improvement of the roads and bridges was possible without increasing the taxes, providing the people were willing to adopt new methods of construction and different ways of spending the money they already raise for road purposes.

The work of the commission is thus at present purely educational, mainly to the end that the people will be aroused to the proper consideration of this question and will better appreciate the plans and suggestions that will be made for the improvement of the roads.

Therefore, the first relation of the State towards road construction should be to have this educational work continued until the people throughout the State have fully realized and put in operation approved methods of road construction and have amended their system of road administration so as to give the most economical results possible. To accomplish this end certain changes are necessary and it should be the concern of the State to have such laws passed as will effect these changes. Some of them we can stop for a moment to consider.

There should be made some provision for the systematic designing and inspection of all bridges throughout the State. Such a plan would be best carried out through the coöperation of county engineers, who should have immediate charge of all bridge construction in their respective counties, under the general supervision of the State Highway Commission, whose approval on all plans should be secured before a given structure could be contracted for or erected.

In order to encourage and further the adoption of better methods of earth road construction, which can be best carried out by using heavy road rollers, it would seem proper for the State to furnish a suitable number of these heavy rollers and expensive machinery for use in the different parts of the State, so that the people in all parts could see by a practical object lesson the advantages of better methods of construction, which can not now be done owing to the small amount of money at the command of each township and the relative high cost of the necessary machinery. A nominal per diem charge could be made by the State for the use of this machinery, to pay for upkeep and renewals.

It should, perhaps, be stated in explanation that the heavy road roller is of quite as much value and use in the construction of good earth roads as in gravel or macadam.

But the best earth roads that can be constructed are often found inadequate to the requirements of the heaviest traveled highways. Practical experience has shown that wherever it is possible to do so, the best method of treating these earth roads is to surface them with some material which will endure and resist the wear and tear of the frequent traffic. The materials generally used and the ones universally found to be satisfactory are broken stone or gravel. There are, however, very large sections of the State which have no such material and consequently the people have not had an opportunity to see, by practical experiments, what value, if any, such construction would be to them.

It would seem that if there was some way for the State to provide such material without undue taxation on the other portions of the State which are well supplied, that it would be a most beneficial thing to do. Such a plan has already been started in this State, whereby the convicts are employed in preparing crushed rock. The work accomplished by the convicts adds nothing to the cost of keeping them; that is, it costs practically the same to maintain the convicts whether they are working or idle. It does not interfere with any existing industries; in fact, the material is used for the most part in places where it has not otherwise been employed, so that the State, so far from interfering with existing industries, is really creating an industry and at the same time creating a demand for free labor, instead of interfering with free labor, as is sometimes the case when the convicts are employed in other occupations.

If this experiment of the State proves practical—and the experience of the past two years seems to point that it is in every way wise, a most practical and successful thing to do—there should be provided additional facilities for preparing this material. Sub-penitentiaries or other means should be provided whereby the convicts could work in stone deposits in the State, which would be selected for their convenience to proper material and shipping facilities. The result of this particular work on the part of the State would be merely to demonstrate in a practical way to the various communities the advantages of crushed rock roads.

When any considerable system of road building is considered it would be out of the question for the State to prepare enough material for any such distribution. At the most, it could be considered as experimental only, but as such would be of immense benefit, particularly as it could be done in so equitable a fashion.

There could undoubtedly be a far more economical method of road administration devised than at present exists. Any change, however, would necessarily contemplate: First, the reduction in the number of the present number of road officers; second, if possible, enlarging the units to be administered. Such a plan would require a great deal of study and time for so radical a change, which is also not without its objections.

In the meantime such steps as can be taken towards better administration should be done. For example, it would be entirely practical for the State to have a law passed by which the township and county officials in each county who have control of the road and bridge affairs, should meet in joint session at least once or twice a year in each county for the purpose of discussing matters of public interest; in very much the same way that the teachers' institutes are held in each county at the present. The dates for these road institutes could be so arranged that, with proper provision for the speakers, the State Highway Commission could furnish a speaker for each institute to discuss with the local officials certain technical features of road and bridge work. The benefit to the taxpayer from such a plan is too evident to need further comment.

Another change in the present plan of administration—which, however, is more of a matter for local consideration than any general State control—would be for each township to have a township road superintendent, who would have immediate charge of all work and make reports thereon to the commissioners, who should not be expected to give any of their time to the details of road construction. They, in their turn, would be obliged to meet but a few times a year merely to transact the general business in connection with their office. In this way it would be necessary to take but a few days from the commissioners' time, and they would therefore, as a rule, draw very much less money from the public treasury than is at present the case, for it is a fact that in a great many townships the per diem charge of the commissioners is over half of all the money raised for road and bridge purposes.

This plan would enable men of large business affairs to take the office of highway commissioner, which they cannot do at present, when it is necessary to give a considerable number of days each year to the detailed supervision of road work.

It is not, however, the purpose of this paper to give in every detail all the changes that could or should be made, even if it were possible to do so. It is intended merely to point out a few suggestions which will create thought and discussion on the subject, which is all that is necessary for better results in any branch of public business.

So far the suggestions here made concern only the ways and means of getting more road improvement from present road tax and without question this is the first thing that should be undertaken. But we should also consider that part of the problem which deals with future work on a larger scale. We, no doubt, can get very much better results and keep our roads in very much better repair with the amount of money being expended. The question is, if the work thus accomplished can meet the growing demands of our progress along other lines.

There is today a need and demand for a system of roads leading from the larger cities. That such a system of roads in any particular locality would materially aid the development of that section, is no theory, but an established fact, from the experience of communities situated all over the country.

It would seem, therefore, if we are to be progressive, that the State should not stop at the point of merely providing for the present moment, but that there should be some way by which a greater progress and development should not only be encouraged, but undertaken.

Perhaps the first suggestion that would occur to anyone is the necessity for some provision by which the various communities throughout the State, who desire to do so, will be enabled to undertake the development of the roads in their vicinity. At present arbitrary political boundaries prevent coöperation between people in the cities and in the outlying districts. In the matter of road development, however, their interests are mutual and there should be some way provided by which each may avail itself of the help of the other to accomplish that which would be for their mutual good. Possibly some arrangement could be made by which certain districts could be formed at the option of the people therein in a somewhat similar way that the road drainage districts have been formed.

There is a plan of which we hear considerable, but which does not seem to meet the economic needs of this State, and that is the construction in the State of through roads. Whatever may be the future development of road traffic in this State, such roads are not today required. If any evidence were necessary, the traffic census taken by the State Highway Commission, which shows that the majority of the travel of today is on the first few miles from a given center, demonstrates that through travel practically does not exist.

What is first needed is the development of roads around the various centers, and when this has been accomplished, it will be full time to take up the question of through roads, if they should be required at that time.

To sum up we may conclude that in order to secure better administration of the road funds and to get more road improvement and more systematic work, it is necessary to have a certain amount of central control on the part of the State; that the State in its relation to the improvement of highways should be undertaken first to secure better results from present expenditures, and should then consider plans by which it would be possible to develop systems of roads about the larger towns and cities. These roads are needed today and will assist in the development of all parts of the State.

Exhibition at 12:00 o'clock of the B. L. K. cow milkers, the cream separator and the Babcock test in operation on the stage of the Coliseum, Superintendent Hall presiding.

Chairman—Ladies and gentlemen, it is now past milking time. The cows are waiting. They must be milked.

[Two cows are led to the stage and put into stanchions with their tails toward the audience. The vacuum pump and the gasoline engine to drive it are on the left hand side of the stage. The cows with the machine for milking between them, are on the right of the center of the stage. The cows are Holsteins, standing very quitely, not seeming to be the least disturbed at the proceedings. In the open space between the cows and the engine are the separator and the centrifugal machine for making the Babcock test.]

President Farr—Some people are asking whether or not these cows are accustomed to being milked with such a machine?

Supt. Hall—No. They never saw the machine before; they never read about it; they never heard about it, and they never even saw a picture of it.

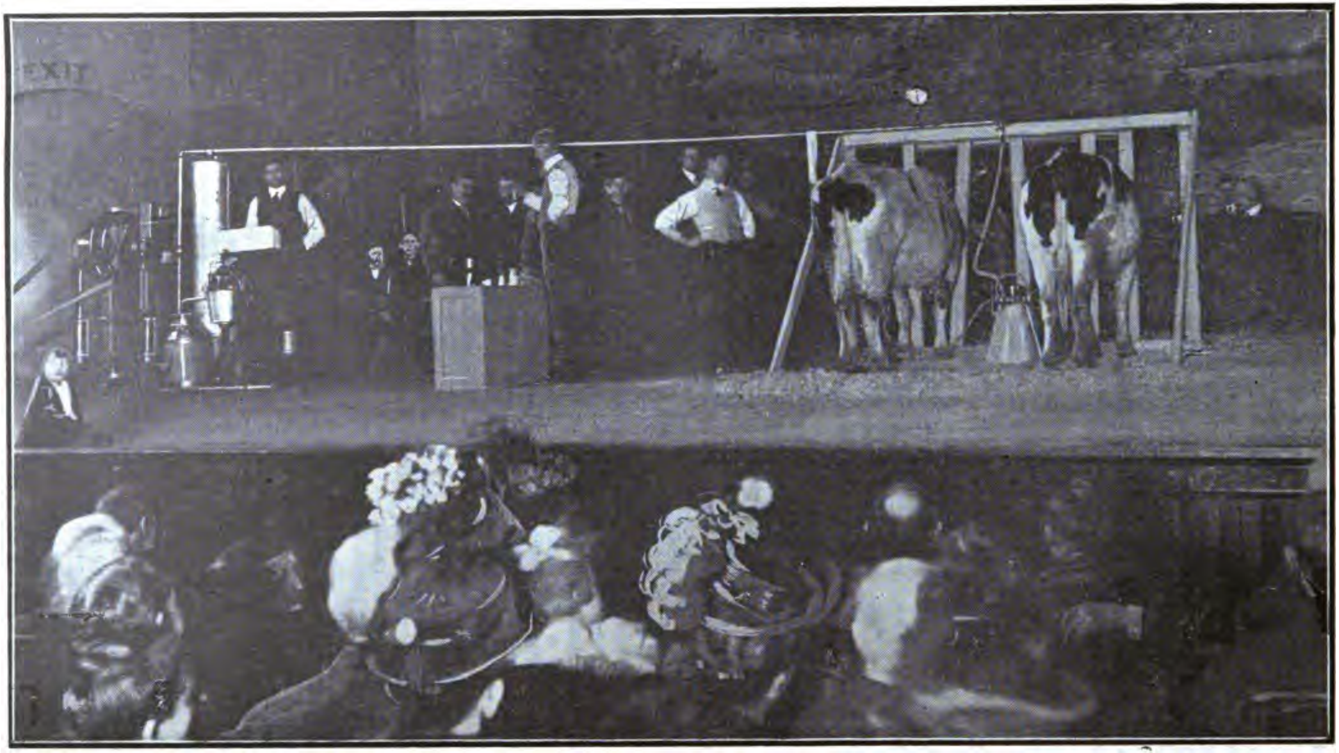
While the gasoline engine and pump are being put in working order I desire to say a few words in explanation of the purpose of this exhibition. I am in no way interested in the sale of any machine that is being exhibited on this stage. I have not the slightest financial interest in the B. L. K. milkers, the United States separator or the Babcock testing machine. The purpose of this exhibition, so far as the management is concerned, is not to advertise the ware that anybody has for sale, but rather to give information as to what is being attempted on dairy lines.

The Babcock test is now in use in all parts of the civilized world. It has the approval of dairymen everywhere. And yet there are many farmers who do not know about it—who do not understand that no owner of ten cows can afford to try to get along without this machine. It is made in many styles and offered for sale at all the dairy supply houses. It costs from four to forty or fifty dollars. A two bottle machine costing the smaller sum named above is sufficient for the owner of 10 or 15 cows.

The Separator. Some twenty-five years ago I read to my pupils, from a farm journal, a description of a machine by means of which it was said that the cream could be separated from the other parts of the milk. My pupils laughed aloud at the idea, and I smiled myself not half believing that it could be true; but as you all know there are many kinds of machines made, this, The United States Separator being one of them, that have proved satisfactory in a high degree in "skimming milk" soon after it comes from the udder of the cow.

We propose to milk these cows with the B. L. K. machines; test the milk for butter fat in the Babcock; run the milk through the separator; then test the cream and the skimmed milk for butter fat.

We hope to be able to test for butter fat, the first milk drawn and the "strippings."



The B. L. K. Cow Milkers and Babcock Test.

The Milking Machines. These are yet on trial. There are some people who have used them and laid them aside. I have used them and have not laid them aside. I have milked thirty cows, night and morning, for half a year or more—almost a year, with a gasoline engine, and we like it, and the cows like it too. Some people don't like it. As I said before it is on trial, and we make this exhibition on the supposition that you are interested in what is being attempted in the dairy world.

[All the machines were then exhibited in operation, and several tests of the milk and cream were made. Many questions were asked and an attempt made to answer them. The more important of these are given below.]

Delegate—What is the smallest number of cows and the smallest number of machines that can be profitably used.

Mr. Hall—In my judgment one could not afford to install the milking machine unless he can use two machines (milking four cows at a time) and milk at least twenty cows.

Delegate—How long does it take one man to milk twenty cows using two machines for that purpose?

Mr. Hall—Nearly one hour.

Delegate—How long will it take a man to clean the machines?

Mr. Hall—The best way for a man to clean the machines is to *get a woman to do it.* It requires from fifteen minutes to a half hour a day to clean two machines thoroughly. The United States Department of Agriculture has caused many experiments to be made in the cleaning of the milking machines. One of the conclusions seems to be that if the machines are properly cleaned the bacterial content of the milk drawn by them may be reduced to one-half that of the best hand milking; that if they are not properly cleaned the bacterial content of the milk drawn by them may be twice that of the worst possible hand milking. (This last statement is my own. Discount it ten per cent if you think it necessary.)

Delegate—Do the machines dry up the cows?

Mr. Hall—Perhaps they do. Perhaps they do not. It will take a long time to be absolutely sure of that. I was in Lincoln, Nebraska a few weeks ago, and there saw the machines used in the presence of an audience nearly as large as this. Prof. Hecker showed us the figures for eight cows milked with the machines for one year and the milk weighed. Here then was an opportunity for comparison. I have not in mind the exact figures. I remember that one cow gave about 9000 pounds the year she was milked by hand and only 7000 when milked with the machine. I remember, too, that in another instance these figures were practically reversed. On the whole a little less milk was obtained by the machine than by hand. But it must be remembered that the men who milked with the machines were "learning the trade" during the first few months of the year, while those who did the hand milking had in all probability learned to do this properly several years before. It may be several years yet before it can be demonstrated that the machines do or do not "dry up" the cows.

President Farr—How do you know when the cows are milked dry?

Mr. Hall—That is one of the "tricks of the trade," sir. By looking into the glass tube it is easy to tell whether milk is coming or not; but that does not settle it. There may be some obstruction. By pulling down gently on the teat-cup, if that quarter of the udder is not dry, the milk will usually start. Then the milker must know his cow so that by feeling the udder he can at least give a pretty good guess as to whether the milk is being "held up." Last, he must take the cup off the teat and see whether or not the quarter is dry; if not, put it back on again. Some strip all their cows by hand; others attempt to do the stripping with the machine itself.

[Note—At 4:30 p. m. the two Holstein cows were milked again, after which two Jersey cows were milked. The Jerseys were a little nervous when first brought to the stage but were perfectly quiet after the machines were attached to them. Questions, answers, and explanations similar to the foregoing were repeated.]

AFTERNOON SECTIONAL MEETING.

THIRD DAY OF INSTITUTE AT PFORIA, ON STAGE AT COIISEUM.. STEREOPTICON.

Director Ralph Allen, Presiding.

ADDRESS, "SOILS AND CROPS."

(By **Cyril G. Hopkins**,)

MR. CHAIRMAN, LADIES AND GENTLEMEN—I may say to you that while I shall talk to you for a little about soils, to illustrate some soil work, we realize that in the growing of crops soil is not the only thing. Not only must we have good soils, but we should have the best possible seed; and Dr. Smith will talk to you about the improvement of the seed. and the quality of the seed, and he will show you some of the results obtained from the work of seed breeding; then Mr. Hume will explain to you more about the work that can be done in taking care of the crops. When we have good seed, and good soil, there are still some things to be done that will be illustrated by Mr. Hume's work.

I was talking to you yesterday about matters of soil improvement, and there are three or four different things that I would like to bring out in the talk this afternoon, including the matter of getting nitrogen from the air, and I will use illustrations that show the effect of inoculating alfalfa, for example, the influence of the bacteria in getting that valuable element from the air.

You perhaps know that the experiment station has learned that the bacteria that live on sweet clover are the same as those that live on alfalfa. Now those that live on red clover are not the same as those that live on alfalfa. You can sow alfalfa on a field well infected with red clover bacteria, and you will not find a tubercle on the roots of the alfalfa. They are a different strain of bacteria apparently, but it has been found that the bacteria that live on sweet clover will also live on alfalfa, and they are apparently the same. We also have some illustrations showing the effect of using lime on sour soils. We don't have acid soils much here in this section of Illinois, but in southern Illinois where the soils are sour, we have some results that will illustrate that point. We have slides that will show the effect of using phosphorus on soils that need phosphorus, nitrogen on soils that need nitrogen, and also potassium on soils that need potassium. Those are the various lines of work. I mention it now, so it will take a little less time when we have the slides going. I can explain it more briefly as we go on.

This (referring to slide on curtain) is a group of the agricultural college students in the wheat field.

This shows you a general view of the Agricultural College buildings at the University.

There are really four buildings in this group and you can get a general view of the four. Here is the main building. This is the dairy building, back of that is the livestock building. Over beyond here a special building for soil work. All through here are experiment fields, which are part of the agricultural college grounds, where a good deal of our experimental work is done. Aside from these fields at the University, we have fields in about twenty-five other places in the State.

A part of the studies are made by pot culture experiments. This illustrated some student work. Here, for example, is a pot that has no plant food in it, but in all of these pots we planted seeds. In this particular case it is rape seed, all planted at the same time all watered at the same time, but in these soil pots they have left out the food element in a certain case. Here is no plant food, and the plant growth is dependent on the small supply of food furnished in the soil. [Referring in each case to illustrations on the curtain.]

Here is everything but nitrogen. In that pot, one element is omitted and the growth is no better than with no plant food. Here is everything but phosphorus, plenty of nitrogen there, plenty of potassium, all of the elements save one, is provided in that pot, but there is almost no growth. Here the element of potassium is omitted; nitrogen, iron, sulfur, magnesium, all of those are present, except one element, potassium, and that omission prevents the development of the plants.

Now, in this pot all plant food is provided, and we have ten times as much growth as in any other pot. The only difference between that pot and this one is potassium. The only difference between that pot and this one is phosphorus. The only difference between that pot and this one is nitrogen; thus showing the absolute necessity for having all the elements of plant food present.

Here is the same thing with clover, instead of rape, you see, the same results, where we have all the elements of plant food present we have a fine crop of clover. This was planted just at the same time all of those were. Here we have omitted in turn, just one element, but we don't get any crops unless we have them all present.

Here is further student work on corn. Now, there is corn growing just from the seed, you might say, without any other plant food supply. Here is all but nitrogen, here is all but phosphorus, here is all but potassium, here is all but the plant food, again illustrating that each element is absolutely essential.

Here is clover, also, with all the plant food supplied; here is all but nitrogen. Here too is all but nitrogen, but we put bacteria in and thus get nitrogen through the air, which is just as good as though we bought the nitrogen and put it in.

Now here is the actual soil. This illustrates pot culture work. Here are four gallon jars. This soil is very poor in nitrogen—comes from the southern part of the State. There is no plant food. You see how the wheat is growing there—little heads of wheat. Here is nitrogen, here is no nitrogen; note the difference in growth. Note what the effect is on the wheat. Wherever you have enough nitrogen you have a good crop. Wherever you have not enough nitrogen you don't get a good crop.

This is somewhat similar soil, but it is not only poor in nitrogen but also poor in phosphorus, two elements deficient. That is a thing that is going to happen to the most of our land ultimately. Those are the two elements I mentioned yesterday that we must look after. Now, this illustrates it very well. There is no plant food applied. There is nitrogen applied alone. You don't get an increase in that crop because it needs not only nitrogen but phosphorus there. Here is phosphorus alone. You don't get much of an increase there, because in that instance we have supplied phosphorus, but it needs also nitrogen. It needs both. There we put in potassium. It produces no effect. Here we put in two elements, nitrogen and phosphorus. See the increase.

Here is an illustration—sometimes you buy phosphorus and put it on the land and you won't get an increase because you haven't used enough clover. Sometimes you try to grow clover that has power to get the nitrogen from the air, but you fail because it cannot get enough phosphorus out of the soil. Those two elements must be provided with our ordinary soil. This is ordinary clover in an ordinary field; here is a field half covered and half bare. It has had no treatment on it. You can see it plainly clear through here. There is lime and phosphorus applied. Here is phosphorus alone. You can see the line right through there. You may not see it as distinctly as in the field, but it shows here. That soil is sour and it needs lime, as well as phosphorus.

That is clover, or it is a field where the clover is failing on our ordinary corn belt land; you see the patches around here, and see the clover here and there. Then keep that in mind and look at the next, which is better clover. Here we have had phosphorus applied, and the clover is very much better. In the average corn belt land in the last three years we have nearly doubled the yield of clover by using the phosphorus. That amounts to more than anything else we have done. Anything that will help clover will help all crops.

Now, in southern Illinois there are lands that have never grown clover because they were sour at the beginning; they can grow a little in the timber lands, some timber lands, but the ordinary prairie lands in southern Illinois will not grow clover. Here is what we get—a little tickle grass scattered around there. Do you see that lime label on there, that is the only difference between the two. You see that is a very fair crop of clover, just with ground limestone. Here is the same thing on another field, in another county in southern Illinois. You see a man stands there, there is some tickle grass, that is about all there is. Looking farther back you will see something growing that looks a little like clover. The next slide will show you what it is. You see the clover blossoms. There is lime and phosphorus on these, that is the only difference. They were all seeded the same day, on land all cultivated alike.

Here are six jars filled with our ordinary corn belt prairie land. You will see three of them have got "Bac" marked on them. They were all planted with alfalfa the same day. The only difference is, those three pots had the bacteria put in, these three here—the others had not. It does not need any further explanation.

Now here is the work in the fields. It is not so distinct, but this side was inoculated, this side was not.

This shows the same idea. This has the bacteria, this has not; otherwise the treatment is just the same.

This is the same thing, excepting we have got some plant food applied in both cases, and the inoculation runs right through on this line here. Those are the same. Here you can nearly see the ground; while on this side the label is almost buried in the alfalfa. The only difference is the bacteria. Now bacteria won't do everything, but they will get nitrogen from the air. Remember that.

Now, here are five pots with alfalfa growing. This has no bacteria in, and here we put in bacteria, from the alfalfa tubercules. Here we put in bacteria from the infected alfalfa soil, here we put in bacteria from the sweet clover tubercle, here from the infected sweet clover soil. This is part of the work done in the investigation to find out whether sweet clover bacteria will take the place of alfalfa bacteria and you will see sweet clover bacteria shows almost as good results as those from the alfalfa.

When we don't put in bacteria, we have practically nothing growing. I don't know whether you can see this very well. You see the tops of those heads, they are men standing in sweet clover. You have seen it grow rank enough. That is where we use it experimentally for green manuring. This shows it growing there, six feet high, about five tons to the acre, on the land.

Now we have a team there and a plow. You can scarcely see here, this is plowed ground with the clover turned over. That is sweet clover, growing for fertilizing purposes.

Delegate—Do you find as much difficulty with the sweet clover as with the alfalfa?

Professor Hopkins—Well, very nearly as much. Where we inoculate sweet clover on the ordinary corn belt land we double the yield. I have known it seeded with oats to fail completely. When the sweet clover is scattered along the roads by the wagon wheels the bacteria are scattered with it. This is ordinary corn growing without any other treatment than ordinary farm manure which has been applied. You keep it in mind and turn to the other slide where we apply phosphorus with it, it will show a difference. The corn stands here away above your head. There we have no manure on, but we do have the phosphorus. On the next slide there is phosphorus and manure together, that is still larger.

This is southern Illinois again. This is corn growing without any treatment. Now keep that in mind, and we will turn right to the same field to a photograph taken the same day, that has the full treatment on it. Just look at it. The one we just looked at made 29 bushels of corn to the acre; this made 64. There wasn't any farm manure put in there. That shows the value of plant food, even if it is put on in something different than farm manure.

Here is some peaty land. See this man standing in the corn fields among the hills of corn? That land is deficient in the element of potassium. It doesn't need lime, doesn't need nitrogen, doesn't need phosphorus. It looks like rotten manure. It is almost. It is just decayed peat, very rich in everything but one element. We have put that element on there, while here we have not put it on. Here is a man standing, the corn is away up several feet above his head. We got four bushels of worthless nubbins here without potassium; while there we got 73 bushels of good corn per acre. Is it any wonder that people of Whiteside county used 13 carloads of potassium salts on their peat land last year to bring about these results?

Now we pass to another plot. Here is treated land which made 73 bushels of corn. Here stands another man, here is another plot, there is potassium again. The line you see is just as sharp as you can apply the treatment. Of course that is very striking, when you get abnormal land you sometimes find only one thing lacking, with all other elements present in great abundance.

This is practical field work, corn grown by E. B. Wills, up above Mendota. He sent me a photograph, showing the effect of potassium. Here is the same land, same kind of soil. Quite a difference between this and untreated land. I did not know anything about this until I received the figures and photographs giving the results. It was treated last fall, part of that 13 carloads, perhaps in that section. Here is treated land, showing a marked difference in size of ears. This was about 40 bushels difference in the yield, I think. We don't often find such striking results.

Here is a group of agricultural students visiting one of the fields in southern Illinois; some live down there, others in other parts of the State. Those are the fields I showed you the results of a moment ago. By leaving Champaign at 1:00 o'clock in the morning and getting back at 12:15 the next morning, we can visit three fields in one day. We make that trip every year.

There is a group of farmers visiting a field at Cutler, Illinois, one of those experiment fields. They have been out over the field and are now just discussing the general results together.

Now Dr. Smith will show you some slides relating to the matter of improving the seed.

Delegate—Will it do any good to put bacteria on an alfalfa field which has been seeded one year?

Professor Hopkins—Why, yes, it is possible you may save a crop by doing that, if they are not already there, but the best way of course is to put infected soil on and harrow it in with the seed. I would like to say that you can get bulletin 76, "Alfalfa on Illinois Soil," which gives all we know about it. Judge Humphrey said yesterday that that bulletin was better than any other literature you can get. You can get further information concerning phosphorus, potassium, limestone, etc., in our bulletins on this subject. Bulletin 123 and circular 116 will give you all this information.

I thank you very much. Dr. Smith will now speak to you. [Applause.]

ADDRESS BY DR. L. H. SMITH.

(Illustrated by Stereopticon.)

Ladies and Gentlemen—We recognize that the improvement of our agricultural crops is to take place along three quite definite lines and these are, (1) better feeding, (2) better breeding, and (3) better care. Professor Hopkins, with his pictures relating to the study of the soils and its problems. has just shown you some things about the feeding or the nutrition of plants. The pictures that I shall show you have to do more particularly with the breeding of plants and Mr. Hume who is to follow will present some phases of the third line of work, namely, the care of the crops.

In the improvement of crops by breeding we have to depend upon selection and selection in turn depends upon variation. Have you ever noticed what a great variation there is among the individuals of any of our ordinary field crops? Go into any field of corn and observe the differences in the various characteristics; there are plants with tall stalks, short stalks, abundant foliage, scant foliage, erect ears, declining ears, productive and unproductive, growing side by side, all under apparently the same life conditions. Every single plant is possessed of a distinct individuality just the same as every animal and the transmission of the characters which go to make up this individuality in plants is just as certain and definite as it is in animals. In selection we simply pick out those individuals having the desirable characteristics and propogate them to the exclusion of others.

We have here in the first picture an interesting example of such a selected variation. In a study of the treatment for alkaline soils in pot-culture there was sown in a series of pots, three years ago, a lot of ordinary spring wheat. In stronger alkaline condition the wheat was unable to thrive with the exception of a single plant. One kernel among them all put forth a strong vigorous shoot that developed into a normal healthy plant which had the power of resisting the injurious effect of the alkali. Seed was saved from this plant and sown the next year and the progeny all resembled the mother plant in being able to withstand the alkali and they produced a thrifty crop while wheat from ordinary seed all succumbed to the adverse conditions. Seed was taken from this crop and the picture before you represents the third generation of this resistant strain. Here in the same soil on the one side of the pot we have the weak spindling growth from ordinary seed and on the other side the strong thrifty plants of the alkali-resistant strain.

The next view shows a series of pots with different proportions of alkali in the soil (the alkali here is magnesian carbonate) and you will notice that in the stronger alkali the difference between the ordinary and the resistant plants is more marked than in the weaker alkali where the injurious effect is not so great.

There are great variations in productiveness as well as in other characteristics and this is particularly noticeable among different ears of corn. Take two equally good appearing ears if you please like the one illustrated in the picture before you, such ears as satisfy all of our notions of perfection in corn, including proper proportion of length to circumference, size, form, shape of kernels, proportion of grain to cob and so on through the ordinary score-card points, put these two ears to a performance test in the field, make them show up their yielding qualities, and it may be that you will find that the one out-yields the other by two to one. There is no way of discovering this difference in productiveness from the appearance. We must put them to the actual test in the field—such a test as is given in our "ear-to-the-row" breeding plot.

The next picture shows the products of two different rows from such a breeding plot. Row 16 planted from a certain ear yielded 202 pounds of ear corn. Row 42 planted the same day in the same soil and given the same care and cultivation but planted from another ear, yielded but 52 pounds.

Delegate—Same kind of ground?

Dr. Smith—Yes. The difference is in the individuality of the ear, the one carried the possibilities of high production, the other did not.

Here is another case of this same sort where the two rows happened to be growing side by side. You see in the photograph the appearance of the two rows as they stood in the breeding plot. Row 12 with its small spindling growth and row 13 with its strong thrifty stand. The next photograph shows the actual yields of ear corn produced by these two rows respectively. Row 12 yielded 40½ pounds, Row 13 yielded 83 pounds.

One of the lines of work in which the Experiment Station has been engaged for a number of years is the breeding of corn for the improvement in the composition of the grain with view of adapting it to different purposes whether for feeding or for manufacturing.

Eleven years ago selections were made, from a variety of corn then known as Burrs' White, to alter the composition, first for increased protein content and thereby enhancing its value for feeding. At the same time another selection was made in the opposite direction to decrease the protein. The effect of decreasing the percentage of protein is to increase the proportion of starch so that such a corn would be adapted to manufacturing in those industries which depend upon starch as their crude product.

The photographs following represent the characteristic structure of these two kinds of kernels. Cutting a kernel lengthwise you find in the middle the germ and usually surrounding this and running up into the crown of the kernels is a white, soft starchy layer, and at the sides a hard flinty portion. This flinty material is richer in protein than the soft starchy part, so that the high-protein kernel is characterized by a larger proportion of this part than is found in the low protein kernel, while in the latter the white, soft starchy part is more prominent.

With this knowledge it is possible to select corn of comparatively higher or lower protein content simply by cutting the kernels with a knife and observing the mechanical structure. A number of corn growers have put this method into practical application and are aiming to increase the protein in their corn by selecting the seed in this manner.

Delegate—Which is the best—high or low protein?

Dr. Smith—If you are feeding, you have to buy bran, gluten meal, cotton seed meal or other concentrated food-stuffs in order to reinforce your corn in the necessary protein, particularly for the production of milk or for feeding growing stock. The corn alone does not contain enough protein to make your balanced ration and the proposition here is to produce the necessary protein in the corn.

Starting at the same time and with the same variety as the protein breeding, selections were made in two directions, namely, to increase the oil in one strain and to decrease it in another.

The practical significance of breeding for increased oil content lies in the fact that the oil of corn is such a valuable commodity on the market that pound for pound it is now worth about three times as much as the starch. It has several uses, the principal one being in the manufacture of fine grades of soap.

On the other hand it is held that for the production of the finest quality of pork the feeding of too much corn is detrimental on account of its richness in oil, which tends to produce a soft, flabby quality of flesh and fat, which is very undesirable, especially for our export trade. A remedy for this defect would lie in a reduction of the oil content of the corn, and in this we have a practical purpose in breeding a low-oil corn, aside from the scientific interest involved.

In the picture before you we have represented the characteristic structure of the high-oil and the low-oil protein. The kernel at the left is from an ear that is about twice as rich in oil as the ear which the kernel on the right represents. Notice the relative proportion of the germ in the two cases. From the fact that the greater quantity of oil resides within the germ, the high-oil kernel is characterized by a relatively large proportion of germ and the low-oil kernel by a relatively small proportion of germ.

The following series of pictures illustrate a few of the different processes for the control of this work of improvement of the composition of corn.

I have spoken of the possibility of judging of the composition by observing the mechanical structure of the kernel. The picture on the screen above shows the man engaged in this work; it is his work to examine a large number of ears and from the structure of the kernel to select those which appear to be best suited to the purpose in hand. The ears thus selected by this cruder method are then subjected to the more exact chemical analysis upon which the final selection of the seed is based.

The ears are sampled by shelling off a row or two of kernels along the length of the ear and for the analysis these samples must be reduced to a fine meal. In the next picture the young man is at work at the mill grinding these samples.

The next view shows the man at the balance, weighing out the samples for the analytical determinations. The apparatus seen at the side is the arrangement for drying in an atmosphere of hydrogen gas for all of the samples must be reduced to a "moisture-free" or "dry-matter" basis in order that the results be comparable. The following pictures show the chemists at work in some of the processes of the protein and oil determinations.

In all of this breeding we recognize the fact that quantity should go together with quality, and in the selection the matter of yielding capacity is given first consideration. The next picture shows the men at work at harvest time weighing the product of each of the breeding rows. Only the best yielding rows are allowed to furnish seed for the coming year, all others being rejected.

Another interesting demonstration of the response in corn to selection for any special characteristic is found in our "High-Ear" and "Low-Ear" breeding plots. We have in the picture on the screen a photograph of these two plots as they stood last season after five generations of selection to increase or decrease the height at which the ear is borne on the stalk. The white line marks the position of the ears on the stalks in the front row of each plot. The average difference in the height of ears in the two plots was last season 39 inches, as determined by the measurement of several hundred stalks in each plot.

The next photograph shows in more detailed two representative stalks taken from each plot, and following is another which shows some of the extreme cases found in each plot.

Delegate—Which yields the best per acre?

Dr. Smith—Thus far the yield is about the same. Last year seed from these two breeding plots, taken to our variety test plots, yielded alike, and this year the Low-Ear out-yield the High-Ear strain by a few bushels.

These plots were started five years ago, largely as a demonstration of the possibilities in selection for special characteristics, but there has come out of the experiment a very practical consideration. As the picture shows, the selection for high ears has resulted in a relatively large, tall, later maturing plant, while the low ears have produced a smaller, shorter stalk and a plant that matures a week or ten days earlier.

Delegate—Out of the same variety of corn?

Dr. Smith—Yes. All from stalks growing in the same field six years ago.

One might suppose that with the small plant resulting from the selection for low ears that the corn would gradually deteriorate and finally the yield would be greatly reduced, but by selecting for good seed ears each year we have been able to maintain the yielding capacity of this Low-Ear plot and have produced in it a quicker maturing strain. The experiment indicates that in selecting for early maturity we should pick ears borne comparatively low on the smaller plants.

The next picture shows how low upon the stalk an ear may develop. At each joint there is a rudimentary ear and it depends upon the development of this little rudiment as to whether we have an ear of corn. Usually in our ordinary varieties but one perfect ear develops. Occasionally there are two or more, depending more or less upon the favorable growing conditions. In this case the ear developed by some unknown reason at one of the lowest joints just above the ground. This, however, was not produced in our Low-Ear breeding plot but is simply a specimen which happened to have been found and photographed.

This brings us to the mention of another line of breeding in which we are selecting for two good ears on the stalk. This work has been under way only three years, so that as yet we do not have as striking results to show as in some of the other lines of breeding, but already the influence of the selection is becoming apparent so that it is now plain that we can produce a much larger percentage of two-eared stalks by persistent selection for this characteristic. The picture before you shows the product of one of the best rows from our two-ear breeding plot last year. Forty-five of the stalks growing in this row bore one ear each and they made a total yield of 25 pounds of ear corn. Fifty-two stalks produced two ears each, yielding altogether 33.75 pounds. Calculating these yields over to the basis of bushels per acre and assuming in each case a perfect stand of two stalks to the hill, planted three feet each way, we would have a difference in yield of about twelve bushels per acre in favor of the two-eared stalks.

It has been the general opinion, I believe, that one large ear per stalk is better than two small ears, although the yield be the same or even a little greater with the two-eared stalks, on account of the greater inconvenience incurred in husking. But that is counting one good ear against two poor ears. If by breeding we can induce two good ears to grow instead of one, then the advantage in increased yield would be sufficient to off-set the extra work involved in handling the crop.

Delegate—One question: Could you not produce the two ears on two stalks to the hill as well as from the single stalks?

Dr. Smith—Yes, but perhaps two stalks with four ears would be still better. The question of more or less stalks per hill depends largely upon the soil. Good rich soil will stand more than poor soil, as experiments of the station soon to be published will show.

The next pictures represent the magnified flowers of the corn plant. The tassel is made up of the male flowers of which the essential organs are the anthers which produce the pollen. The female flowers are situated in the ear and the development of the kernel results from the fertilization by the pollen coming in contact with the silks as shown in this photograph. In the process the pollen grain germinates throwing out a little tube which finds its way down the length of the silk and finally comes in contact with the reproduction cell of the kernel. There then follows the fusion of a tiny quantity of substance from this soil and from the pollen cell and as a result of this fusion the kernel develops. If, for any reason this fertilization process fails to take place, the kernel does not develop.

Corn is by nature a cross-fertilized plant and in-breeding appears to have a very detrimental effect as demonstrated by the next two pictures. The first plot is from seed which has been continuously in-bred for five generations through hand-pollination. In these experiments we force the corn to in-breed by collecting pollen from the tassel of a certain plant and bringing it on to the silk of that same plant. A number of seed ears is produced each year in this way for planting the in-bred plot the following year.

For comparison we have conducted a second plot in which we have caused the corn always to cross-breed by collecting the pollen from certain plants and bringing it to the silks of other plants. Thus we have the same somewhat artificial conditions arising from the hand-pollination in both plots and thereby fair comparison.

Compare the backward, stunted growth in the first picture of the in-bred plot with the healthy vigorous condition in the second photograph taken on the same day of the cross-bred plot. The yield from the in-bred plot last year was about 26 bushels per acre while the cross-bred strain yielded 76 bushels, or a difference of 50 bushels to the acre.

During these same years we have conducted a third plot in which we have also had cross-breeding, but in which the pollen has always been collected from barren stalks. As yet there has appeared no marked detrimental effect either upon the yield or the number of barren stalks produced. Comparing the next photograph with the last you see there no apparent difference in the condition of the two plots.

There are just as great variations to be found among the individual plants of the other farm crops as there is in corn, and clover furnishes an extremely interesting lot of variations.

The work in clover breeding at the Experiment Station has not been going on very long, but already we are finding wonderful variations in many characteristics, such as productiveness, hardiness, habits of growth, amount of foliage, maturity, tendency to blossom, leaf markings, chemical composition, etc., and the remaining pictures illustrate just a few of these points.

In our clover breeding plots all of the seed from a certain mother plant are planted together, either in a row or a little plot corresponding to the ear-to-the-row-system in our corn breeding plots. In this way the family characteristics are brought out in a striking manner. Notice in the picture on the screen what a scattering stand we have in the plot at the left as compared with the neighboring plot. This is due to the faulty germination of the seed from that particular mother plant.

In the next picture we have a representative plant taken from each of two which would be furnished by fields of such plants. In the two cuttings last season we harvested one and six-tenths times as much hay from the plot which the larger plant represents as from the plot represented by the little plant.

The next picture illustrates another variation and here again we have taken a typical plant from each of two plots where a great difference in the tendency to produce blossoms in this crop was apparent. On the one plot we counted 130 blossoms and on the other 426, both from about the same total number of plants. If this difference in the tendency to produce blossoms in the first year can be taken as an indication to do the same and to produce seed in the second year, then we have here a very practical consideration, especially with clover seed at twelve dollars per bushel.

The last photograph shows a variation in leaf markings, some strains having the characteristic white V-shaped marking very prominent, as illustrated in the leaf at the left, while in others this marking is less pronounced or totally absent, like the one on the right. We do not now that there is any practical point connected with this little character but in the plant breeding work it is important to take note of all such things for it may well transpire that just such a seemingly unimportant little character as this will one time be the means of revealing some important principle which is as practical as anything with which we have to do.

I thank you for your attention.

[Applause.]

Chairman—Prof. Hume, who has charge of Crop Production Experiments at the Illinois Experiment Station, will now address you.

A. N. HUME.

ABSTRACT OF ADDRESS.

(Illustrated by Stereopticon.)

SUMMARY OF BULLETIN No. 96.

(Illinois Experiment Station.)

1. It would be possible to make a test of the vitality of every ear of corn used for seed in Illinois.
2. The testing may be done with plates of sand or with a box and blotters, or with a box and folds of canton flannel. The *method* of doing the work *is not* so important as that it be done thoroughly.

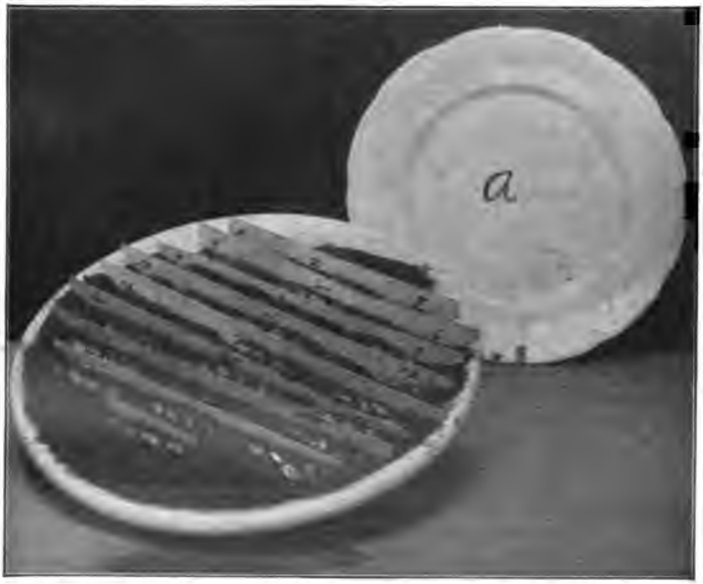


FIG. 1.

PLATE 1.—Fig. 1 shows groups of Kernals from single ears, ready to be put into the germinating room.

3. One man can test enough seed corn for sixty-seven acres by the use of ten hours total time.
4. It is estimated that over $8,000,000 annually may be saved to the corn growers of Illinois if all seed corn planted be properly tested.
5. It is reasonable to conclude that Illinois corn growers ought to be absolutely certain about the vitality of seed corn before it is planted.

To bring the matter of testing seed corn as closely home as possible to the individual farmer, suppose that he raises 80 acres of corn, and that his normal yield is 60 bushels per acre, giving a total of 4,800 bushels. His average loss this year was 8.81 per cent of that amount, or 422.88 bushels. Valuing this at 40 cents a bushel, we have a loss of $169.15 due to the use of untested seed. This amount would pay the necessary wages for testing every ear of seed corn which would be used on 7,555 acres of land, counting the wages at $1.50 a day. These figures ought to appeal not so much to our seed dealers as to farmers and corn growers. They are the people interested.

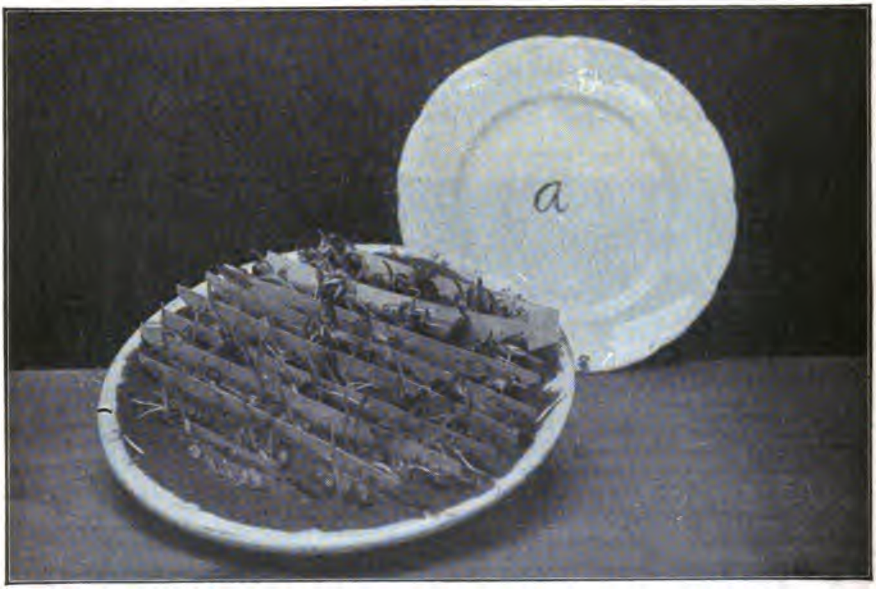


Fig. 2.

Fig. 2—The same kernels, germinating, ready to count.

The object toward which we are all striving, is that agriculture be made an exact science. The testing of each ear of seed corn, whenever necessary,

Corn Cultivation.

All men who cultivate corn have two objects in so doing. First, to kill weeds, and, second, to stir the surface soil. From the standpoint of yield, the problem of weed eradication is one of prime importance. In Illinois, if weeds were permitted to grow at will, no yield whatever of corn could be expected, even on land that had been well prepared and planted. Although it is understood that weeds are certain to injure corn when they are permitted to grow, the extent of such injury is not always appreciated. The following lantern slide is from a photograph taken last summer. The plot of land represented was well prepared, and good seed corn was well planted in it. The weeds did the rest; not a single ounce of corn was produced by the plot.

PLATE 1.

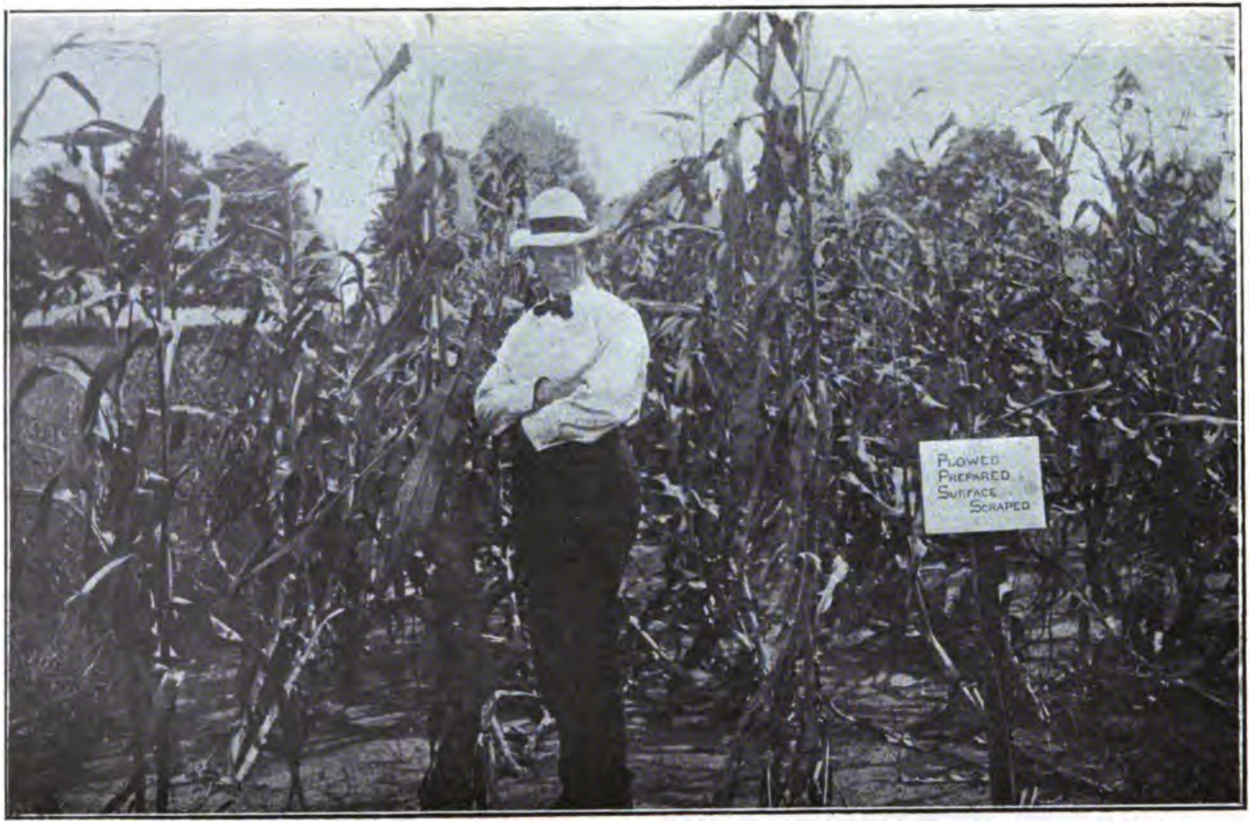


PLATE 2.

PLATE 3.

The next slide is from a potograph of a nearby plot, prepared in the same way and planted at the same time with the same kind of seed. The soil on this plot was not stirred throughout the season, but the weeds were kept constantly removed by scraping them off with a short hoe. It is well illustrated even by this one trial that a good crop of corn may be raised without any stirring of the surface soil, provided all growth of weeds is prevented.

The practical way to remove weeds and to prevent their growth in corn is to stir the ground with a shallow cultivator. Following is a lantern slide of a plot situated nearby the other two; this latter plot having been one that was well prepared and cultivated by the usual methods. The yield of corn from this plot was several bushels more than the plot that was only scraped·

In the corn belt of Illinois the most profitable amount to cultivate corn is that amount which will eradicate the weeds, not more, not less. Although an increased number of cultivations return a larger yield, existing data indicate that the increase does not return a profit for the labor expended. This statement is based upon the following tabular summary which is taken from Illinois Experiment Station Bulletin number 31.

Results With Corn—Frequency of Cultivation, Yields in Bushels per Acre, Average for 5 years.

Kind of Cultivation.	Yield per acre.
None, weeds scraped off with hoe	68.3
Shallow, four times	70.3
Shallow, twelve times	72.8
None, weeds allowed to grow	00.0

SUMMARY OF BULLETIN No. 121—ILLINOIS EXPERIMENT STATION.

The present data indicate that Turkey Red wheat is the highest yielding for Central and Northern Illinois.

Dawson's Golden Chaff has made the largest average yield next to Turkey red.

Fulcaster and Harvest King are the best yielding wheats among those tested for Southern Illinois.

Frequent changes of seed wheat are not advisable; new varieties should be introduced only after thorough trial; home grown seed is likely to be most profitable for practical wheat growers.

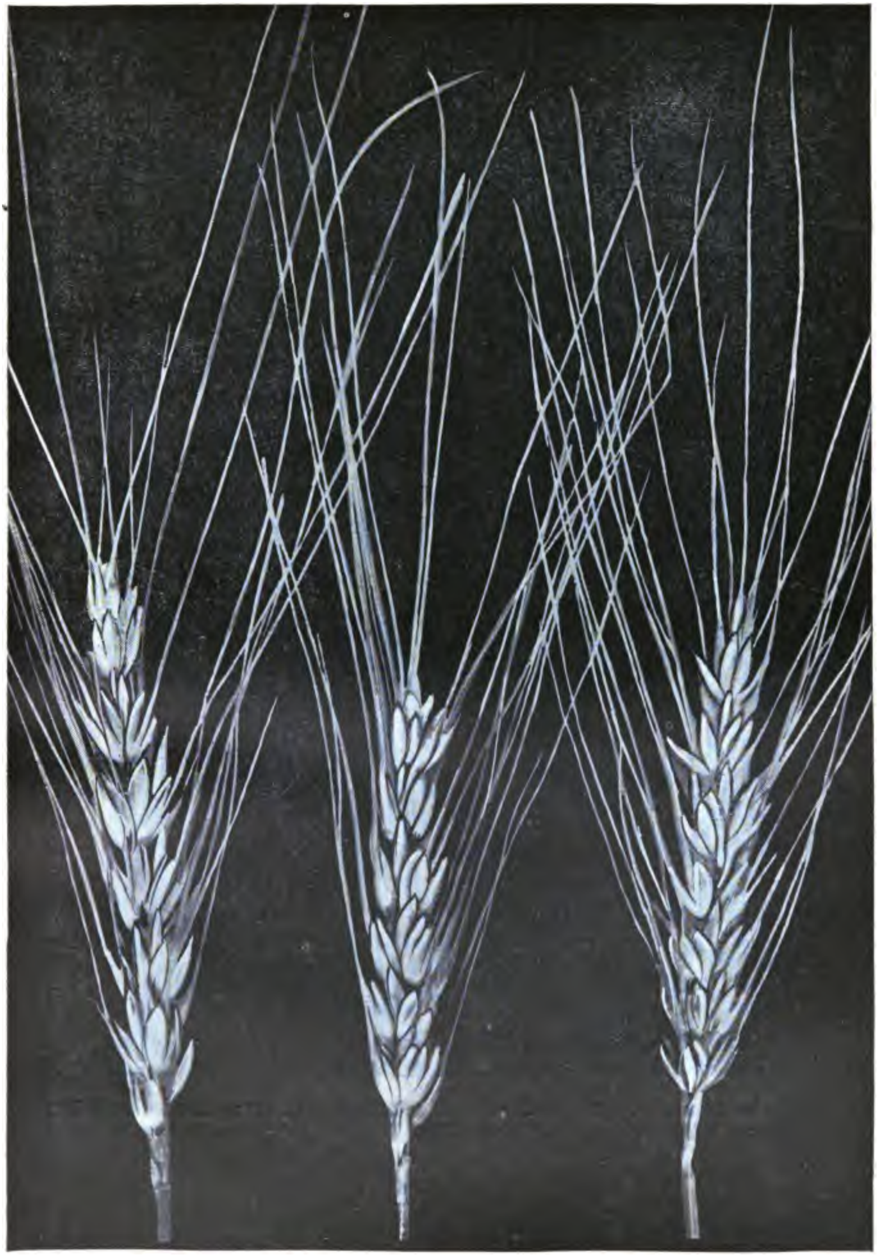


Plate 4—Typical Heads of Turkey Red. This Type of Wheat Gave the Highest Average Yield Among the Varieties Tested at Urbana.

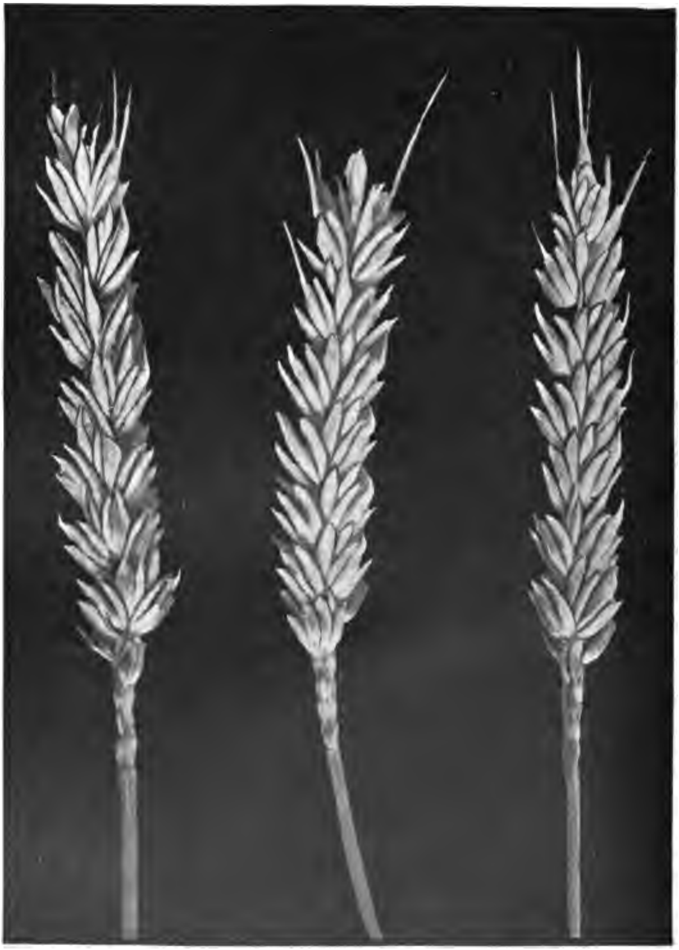


PLATE 5—Dawson's Golden Chaff. The Wheat that Gave the Second Highest Average Yield on the Urbana Field.

Yields of Variety Wheat, Experiment Farm, Urbana.

Name of variety.	Actual yield per acre, (bushels).				
	1904.	1905.	1906.	1907.	Four-year average.
Turkey Red	32.1	30.0	46.6	45.5	38.5
Malakoff	31.4	27.7	46.4	45.5	37.7
Hungarian	18.9	29.0	36 0	42.4	31.6
Dawson's Golden Chaff	16.8	25.1	36.4	47.5	31.4
Rudy	12.7	27.9	38.2	43.9	30.7
Indiana Swamp	12.8	28.7	37.0	41 6	30.0
Wheedling	15.2	25.5	40.2	38.5	29.8
Poole	7.8	....	....	....	....
European	11.9	....	....	....	....
Jones Longberry	10.4	26.6	....	....	....
Satisfaction	13.8	24.3	....	....	....
Red Hussar	....	24.0	40.7	44.2	....
Beloglina	....	30.8	37.0	41.1	....
K. B. No. 2	....	22.3	40.5	40.2	....
Pesterboden	....	....	41.1	43.8	....
Kharkov	....	....	39.1	43.6	....
Padi	....	....	35.2	32.5	....

TESTS IN SOUTHERN ILLINOIS.

Variety tests of wheat have been conducted at two different points in Southern Illinois,, at Cutler, in Perry county and at Fairfield, in Wayne county. The Cutler field is located on the farm of Mr. W. E. Braden and has been operated in connection with soil experiments at that place. The tests have been directly supervised by Mr. J. E. Readhimer, Superintendent of Soil Experiment Fields. The tests of wheat were started in 1902 and have been continued since, so the average yields are valuable data. The following table summarizes the yield at Cutler:

TABLE 4.—*Yields of Variety Wheat at Cutler, 1902-1907—Bushels per Acre (60 lbs.)*

Name of variety.	1902.	1903.	1904.	Three year ave.	1905.	1906.	1907	Three year ave	Six year ave.
Fulcaster (Home)	16.4	9.0	15.0	13 5	12.8	21.9	23.7	19.5	16.5
Harvest King (Home)	16.3	14.8	15.6	15.6	11.5	20.6	17.7	16.6	16.1
Red Fultz (Home)	15.3	7 7	15 3	12.8	12.6	21.9	18.3	17.6	15.2
Eclipse (Home)	16.8	5.4	13.7	12.0	10.7	22 9	20 2	17.9	14.9
Harvest King (Indiana)	10.9	10.5	13 8	11.7	11.6	22.5	18.5	17.5	14.6
Hybrid Beechwood	11.9	9.0	12.8	11.2	11.0	22.7	18.3	17.3	14.3
European	11.6	6.4	13.3	10.4	11.0	19.2	20.4	16.9	13.6
Harvest King (Michigan)	14.3	5.5	12.7	10 8	......	......	......	......	......
Poole	12.1	5.2	13.6	10.3	......	......	......	......	......
Jones Longberry (Home)	16.0	4 3	10 3	10.2	......	......	......	......	......
Dawson (Michigan	11.4	6.3	11.2	9.6	......	......	......	......	......
Fultz (Tennessee)	10.2	4.0	11.8	8.7	......	......	......	......	......
Fultzo-Mediterranean	12.5	1.7	11.4	8.5	......	......	......	......	......
Indiana Swamp	11.0	3 2	11 3	8.5	......	......	......	......	......
Jones Longberry (Indiana)	6.0	3.5	8.8	6.1	......	......	......	......	......
Turkey Red	......	......	11.4	......	9.0	13.8	......	......	......
Beardless Rural New Yorker	......	......	......	......	9.3	18.2	18 0	15.2	......
Knight & Bostwick No. 2	......	......	......	......	8.7	15.6	16.8	13.7	......

The following illustration makes it possible to compare in a general way the root systems of oat-plantlets from drilled plots and broadcasted plots. The plantlets in the upper row were from broadcasted plots and those in the lower row were from drilled plots. It is easy to see that the depth of

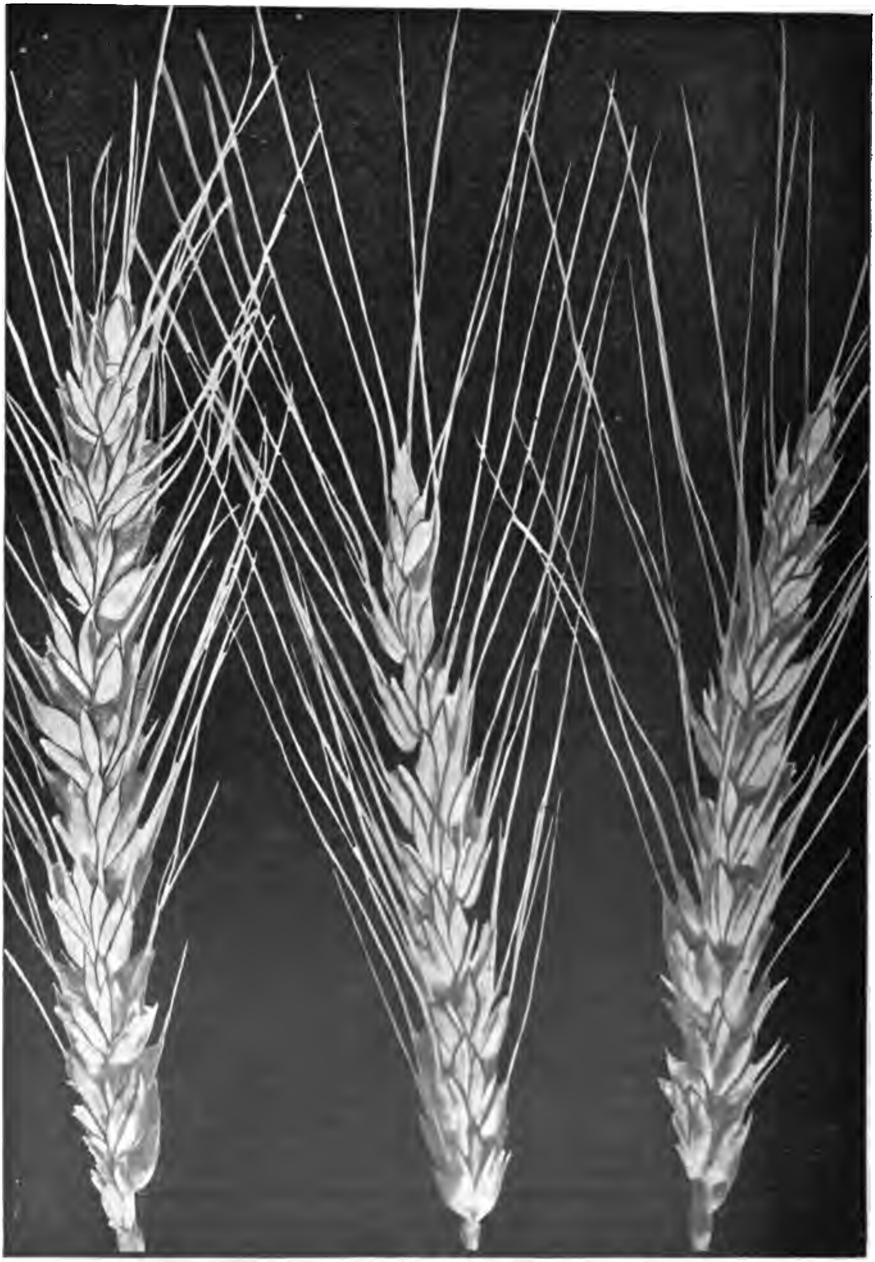


PLATE 6—Fulcaster. The Highest Yielding Variety Tested on the Cutler Field.

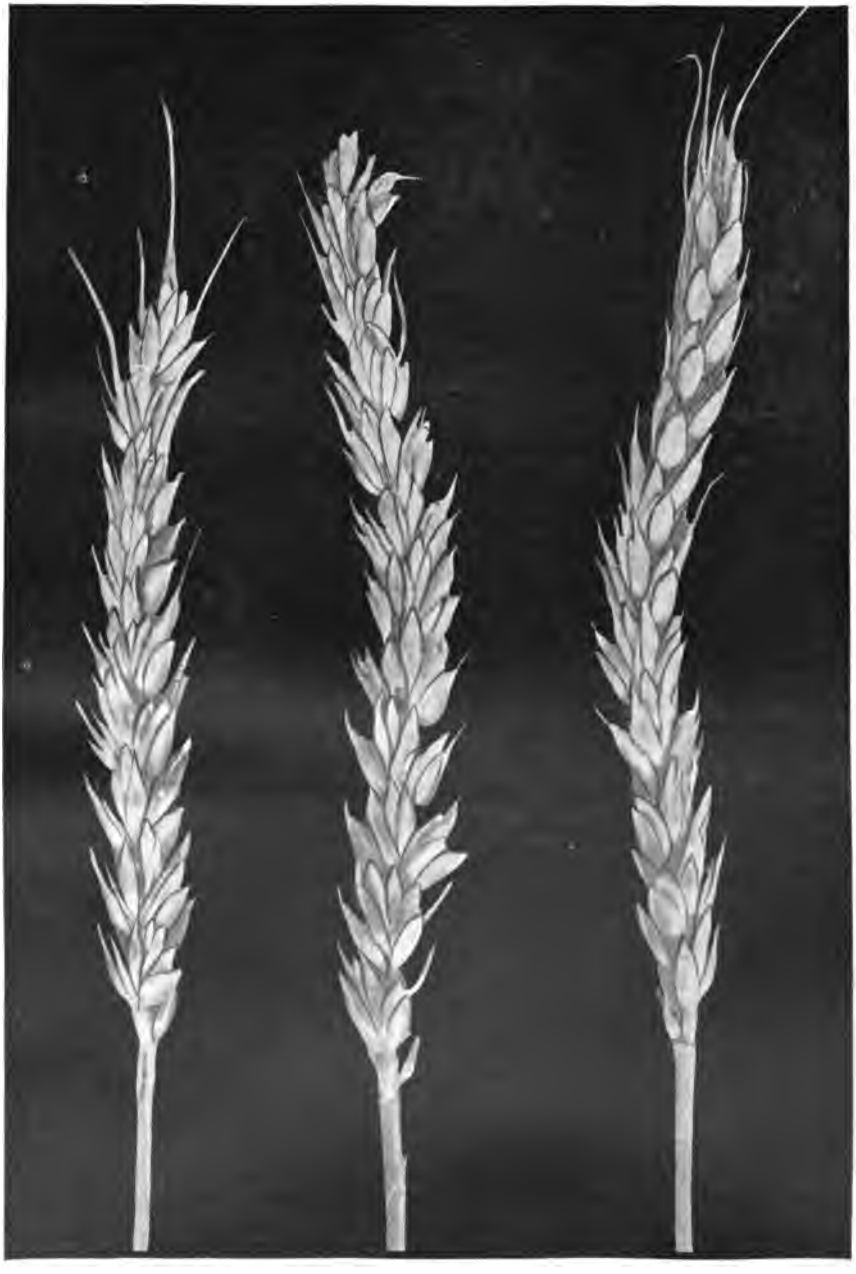


Plate 7—Harvest King. Home-grown Seed of this Variety Gave the Second Highest Average Yield per Acre at the Cutler Field.

rooting of the drilled plants was greater, and what is no doubt of more importance the uniformity of this depth throughout the field was much greater on the drilled plots. With equal amounts of seed per acre, more oats can be produced per acre by drilling in the seed than by broadcasting it.

SUMMARY OF EXPERIMENTS ON METHODS OF SEEDING OATS.

(1.) The average yield of drilled oats at Urbana on eighteen plots for two seasons was 6.8 bushels per acre in favor of drilled oats.

(2.) A similar average from DeKalb Crop Production field, was 6.5 bushels per acre, in favor of the use of the drill.

(3.) The average in favor of drilling, for two years at Sibley field was 2.4 bushels per acre.

(4.) As an average of these averages the gain for drilling oats as compared with broadcasting is 5.2 bushels per acre.

Delegate—One question please: In drilling those oats, you have not experimented as to depth?

Answer—No, not in this instance. In Illinois Experimental Station Bulletin No. 41, however, it is reported that one inch is the best depth for seeding. Oats were seeded at depths ranging from 1-6 inches for six successive seasons, with the conclusion stated.

Delegate—In the preparation of the ground for drilling oats, how many times should it be worked?

Answer—Work the ground enough and in such a way as to prevent weeds from growing up into the oats. On clean corn ground, no further preparation may be necessary. However, where the land is weedy, better returns may be expected from land thoroughly disked or even plowed. It will not pay to plow if the land is reasonably clean. Do not plow land for oats for any purpose, except to get rid of weeds.

Delegate—Would it pay to plow land for oats and then use the drill, assuming that your area were small and that you had time to do it?

Answer—Yes. Under such conditions I think it would.

Chairman—The live stock section will occupy this room for the next hour. Dr. Hopkins will talk on alfalfa on the south side, during the next hour; the poultry section will occupy the north side. We will now adjourn.

Adjourned.

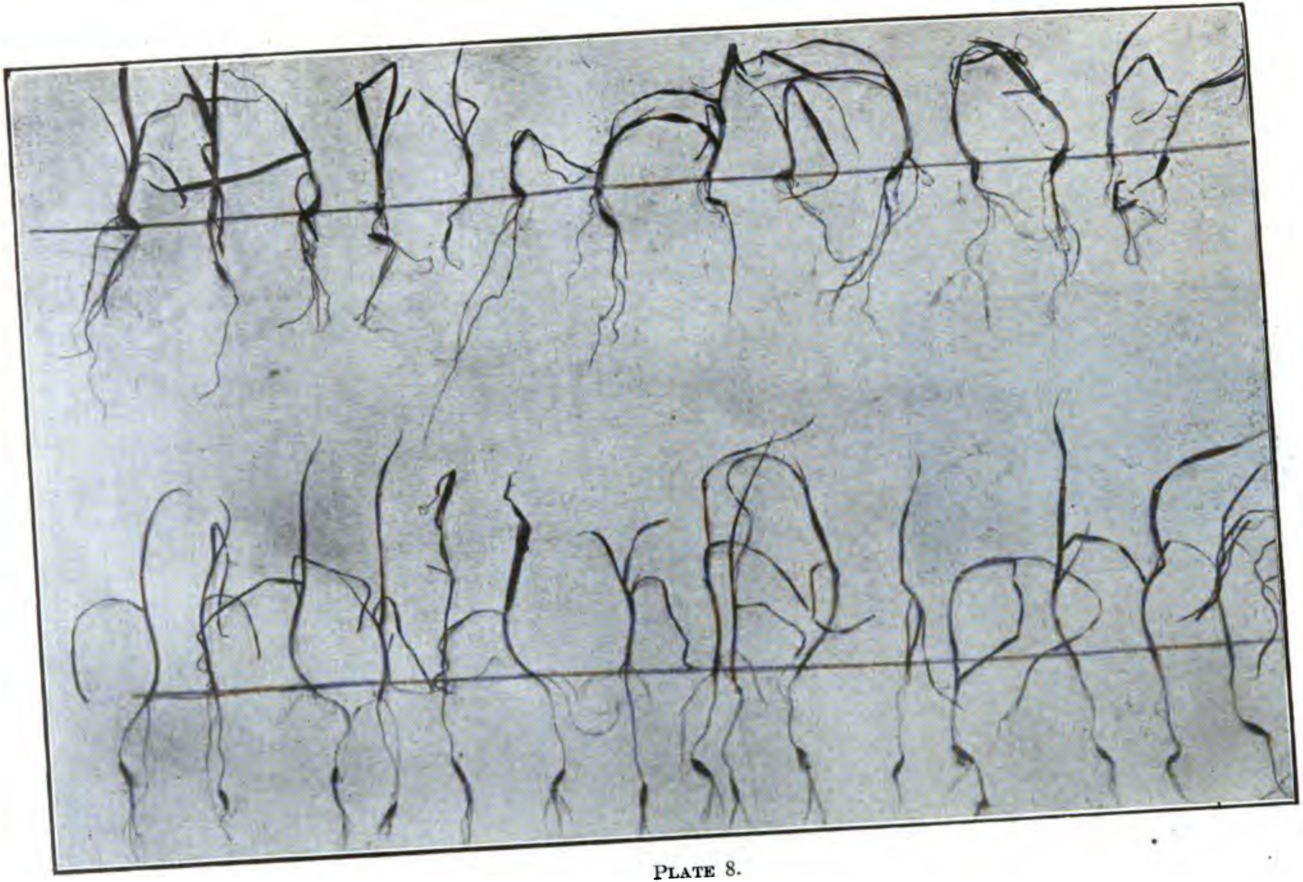


PLATE 8.

IMPROVING ILLINOIS DAIRYING.

(Prof. C. C. Hayden.)

Mr. Chairman, Ladies and Gentlemen—I am to talk to you about feeding, or another way of improving the dairy business of Illinois. There is as much room for improvement in our methods of feeding as in our methods of breeding cattle. My time is limited and I shall attempt to bring out only one or two points on the subject.

Grains are expensive, especially those high in protein. Where are we going to get something to balance our rations? We can raise plenty of corn to feed. That must form perhaps the greatest part of our grain ration, but we must have something to bring up the protein. What are we going to get for this purpose? You know the expense of concentrates, or by-products, bran, gluten feed, cotton seed, meal, oil meal, etc., which we must buy, These will always be limited in Illinois, and in the entire country, because they depend upon the manufacture of other products. They will always be in the hands of great corporations who can regulate the price as they see fit. How are we going to get hold of something which we can control ourselves, so that we can produce our protein on our farms. For some time we have been advocating the raising of clover, alfalfa, and cow peas and other leguminious crops, to get the necessary protein to balance up our ration. Can we do it?

I am going to call your attention to a little demonstration, showing the way many of our dairymen are feeding and the way they might feed. We know that a very large number of them are feeding timothy hay and corn products; that is, corn and corn stover, without a legume of any kind.

For this demonstration a herd situated in the dairy district was chosen. It consisted of 20 cows, 18 of which were in milk during the demonstration. They were kept on the farm and cared for by the owner (Charles Kilkerson, Marengo, Illinois).

These cows were divided into two lots of nine each, one lot standing on either side of the barn. No attempt was made to divide them equally regarding milk flow or period of lactation. The majority of those in lot 1 had calved recently or calved during the early part of the test. The majority of those in lot 2 had been in milk longer (See charts). Lot 1 gave more milk than lot 2. The object was not to compare the two lots directly, but to compare the two feeding periods in the same lot, using one lot as a check against the other.

It will be noted, as stated above, that some cows did not calve until after the feeding began. It will also be noted that the columns in the table showing their production have been filled in back to the beginning. It does not give a correct average for the period, but gives an average much more comparable with the following period, than if only the figures from those in milk had been taken. We think that you will agree with us that the differences have been decreased by this method.

METHOD OF FEEDING.

Throughout the entire demonstration the grain consisted of corn and bran equal parts by bulk, or about 2 7-9 parts corn meal to 1 part bran by weight.

During the first period lot 1 was fed 10 pounds of timothy hay, 13 pounds of grain and 10 pounds of corn stover. During this same period lot 2 was fed 10 pounds of alfalfa hay, 13 pounds of grain and 19 pounds of corn stover. During the last week of the first period the grain was raised to 14 pounds. At the end of eight weeks the hay was changed on both lots, lot 1 receiving the alfalfa and lot 2 the timothy. The grain was changed to 12 pounds and the corn stover remained the same for both lots. This food was not weighed to each individual cow, but to the lot, then divided nearly equal or according to milk flow.

The records were kept for 25 weeks in all; three weeks before the test started; one week before each period, for the cows to adjust themselves to the change, and four weeks after the close of the second period. The preliminary period of feeding was from November 26 to December 17. During this period the roughage consisted of corn stover and a mixture of alsike clover and timothy.

The first period of eight weeks from December 25 to February 18. The second period of eight weeks extended from February 25 to April 22. The charts on following pages show that it required about three to four weeks for the cows to adjust themselves to the change in the ration. The milk flow increased or decreased very rapidly for that length of time, when a more or less constant flow was maintained. Eight weeks is a short period for a feeding test, yet at the end of this time the owner was glad to change the rations, because lot 1 had lost two much in milk flow, in flesh and in general condition. If such a change takes place in such a short time, it is easy to see how many of the dairy cattle of Illinois come out of the winter in such poor condition and have a very small milk account to their credit.

There is much in breeding and in the individuality of the cow, but there is also much in careful feeding.

The following tables show the weekly production of each cow and the average for the nine cows in each lot.

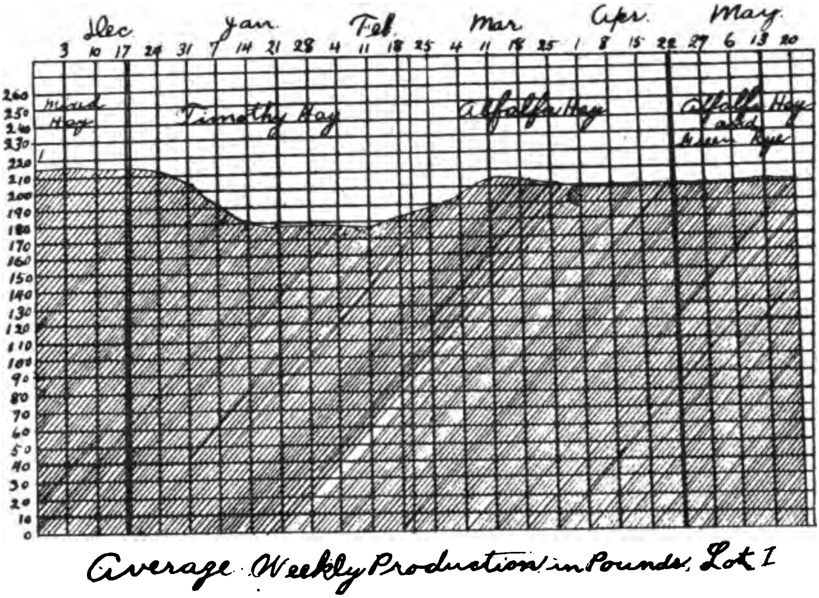
Lot No. 1.

Week ending—		Lucy.	Blue.	Black.	Lill.	Joe.	Spot.	Line Back.	Star.	Molly.	Av.
December	3	203.0	198.5	202.3	240.0	220.0	210.0	197.5	250.0	218.0	215.5
	10	203.0	205.9	203.7	240.0	220.0	210.0	194.2	250.0	218.0	216.1
	17	203.1	204.7	206.5	240.0	220.0	210.0	188.6	251.5	218.0	215.8
	24	198.3	192.7	207.6	240.0	215.0	208.0	180.3	248.2	218.6	212.1
	31	192.2	191.6	206.0	238.0	210.0	200.0	177.3	235.2	198.3	205.4
January	7	174.7	157.0	179.4	236.0	220.6	198.0	177.0	195.5	187.3	191.7
	14	168.8	172.3	180.0	234.8	199.0	194.0	173.7	193.2	197.9	190.4
	21	170.3	180.7	181.1	228.3	205,2	192.0	166.1	188.0	178.1	187.7
	28	169.5	180.8	186.9	221.8	203.7	189.0	167.5	197.2	186.6	189.1
February	4	172.1	181.2	189.0	209.8	206.1	185.0	173.2	203.3	176.2	188.4
	11	174.2	180.5	189.6	212.7	189.1	187.3	172.7	214.2	157.0	186.3
	18	179.3	184.6	189.5	229.9	194.5	199.4	168.1	212.5	173.1	192.3
	25	186.5	188.6	190.1	231.0	203.2	199.6	159.6	212.4	181.1	194.6
March	4	192.9	205.0	199.6	231.8	207.3	215.3	172.9	225.0	198.7	205.4
	11	198.7	212.1	200.5	247.4	215.5	219.7	181.1	233.6	203.2	212.4
	18	202.5	204.5	202.0	243.0	220.9	220.8	184.4	242.1	186.5	211.8
	25	206.6	209.9	200.8	243.7	224.7	219.9	175.5	242.8	180.7	211.6
April	1	198.8	208.4	194.8	239.1	220.7	215.4	170.1	239.8	186.1	208.1
	8	201.8	200.1	195.7	234.9	201.6	216.2	176.5	235.0	202.9	207.2
	15	200.3	196.8	194.6	240.3	204.9	210.0	173.7	230.0	202.2	205.8
	22	200.7	208.2	189.2	229.0	229.0	218.0	174.7	225.2	199.6	205.4
	29	205.3	211.9	194.5	230.4	155.3	*229.4	180.9	236.9	209.5	206.0
May	6	206.8	221.5	186.0	239.7	165.2	231.4	190.1	247.8	207.8	210.7
	13	204.3	211.0	174.1	249.9	181.8	238.4	194.7	238.2	205.3	210.8
	20	205.8	212.9	175.4	251.8	192.4	232.3	190.7	241.5	187.9	210.8

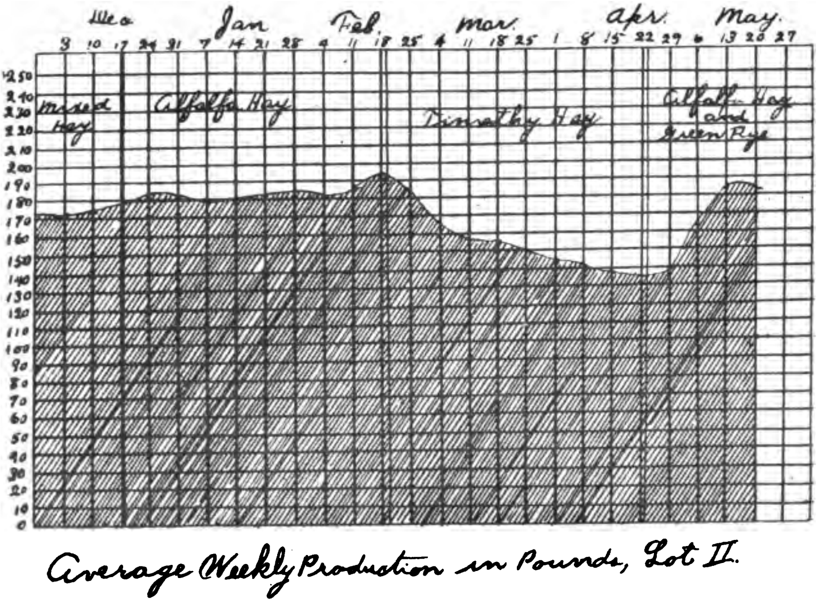
* Off feed, scouring.

Lot No. 2.

Week ending—		Brindle.	Goldie.	Belle.	Maud.	Pet.	Emma.	Topsy.	Eva.	Rose.	Av.
December	3	149.9	237.7	159.9	111.0	153.1	178.7	144.1	188.8	179.7	171.2
	10	151.2	237.7	198.1	120.5	155.1	175.7	149.8	195.4	184.6	174.5
	17	154.6	237.7	204.3	121.5	148.0	178.6	156.4	206.1	189.9	177.7
	24	165.2	237.7	213.2	123.6	158.8	184.9	162.3	206.1	191.1	182.8
	31	162.1	237.7	214.5	127.6	150.8	182.4	159.5	206.4	196.5	182.2
January	7	158.2	237.7	218.0	122.6	147.6	180.8	152.2	199.0	187.8	178.4
	14	156.7	237.7	219.1	126.7	154.1	182.3	163.6	203.6	192.8	182.1
	21	166.1	237.7	214.6	126.6	155.8	183.8	162.7	206.7	193.1	183.2
	28	169.3	237.7	223.8	128.9	154.0	182.2	170.2	211.2	194.5	186.0
February	4	145.6	237.7	224.8	124.6	145.1	184.4	165.5	213.9	199.9	182.4
	11	158.1	264.5	221.3	129.5	144.0	183.3	170.0	216.9	201.8	187.7
	18	161.4	289.6	221.4	136.4	149.4	180.4	168.6	224.8	206.8	193.1
	25	158.0	267.6	208.0	130.9	149.6	174.4	167.3	209.1	194.6	184.4
March	4	147.8	233.3	185.2	115.7	138.6	155.5	150.5	189.8	172.2	165.4
	11	139.6	219.5	168.1	112.2	135.8	144.1	149.4	184.2	162.9	157.3
	18	137.0	221.3	167.2	105.2	139.5	153.0	152.8	184.7	163.6	158.2
	25	134.4	210.2	164.1	79.6	114.9	147.9	156.9	186.2	161.9	150.7
April	1	135.5	196.5	164.2	59.2	116.2	147.9	154.4	172.2	159.8	145.1
	8	131.1	187.3	148.9	87.3	177.3	143.4	148.3	156.8	152.2	141.4
	15	129.7	176.8	158.4	82.7	116.2	134.4	149.5	141.6	154.3	138.2
	22	123.8	173.8	152.5	75.7	118.2	141.0	142.6	133.2	152.2	134.8
	29	136.4	188.7	168.7	88.1	128.8	153.3	154.2	115.1	120.0	139.2
May	6	160.0	228.3	188.7	98.1	123.4	178.0	165.8	173.7	287.7	167.1
	13	177.4	233.7	189.2	114.4	142.8	181.5	180.4	165.7	199.7	176.1
	20	164.6	235,8	189.8	121.1	133.0	172.5	175.0	159.4	195.8	171.9



Lot 1. Average Weekly Production in Pounds.



Lot 2. Average Weekly Production in Pounds.

Date of Calving.

Lot 1.		Lot 2.	
Lucy	Calved Dec. 5, 1906	Brindle	Calved Sept. 24, 1906
Blue	calved Sept. 14, 1906	Goldie	calved Jan. 25, 1907
Black	calved Sept. 8, 1906	Belle	calved Nov. 8, 1906
Lill	calved Jan. 3, 1907	Maud	calved Aug. 15, 1906
Joe	calved Dec. 25, 1906	Pet II	calved Sept. 3, 1906
Spot	calved Jan. 27, 1907	Emma	calved Oct. 25, 1906
Lineback	calved Nov. 13, 1906	Topsy	calved Aug. 31, 1906
Starr	calved Dec. 6, 1906	Eva	calved Sept. 19, 1906
Molly	calved Dec. 15, 1906	Rose	calved Sept. 30, 1906

Lot I produced 9 per cent more milk during the period fed alfalfa than during the period fed timothy. The average per cow for the eight weeks fed alfalfa was 1,667.7 pounds, and the average when fed timothy hay was 1,531.3 pounds. 1,667.7—1,531.3=136.4 pounds difference. 136.4×9=1,227.6 pounds, the loss for the entire lot while fed timothy.

Lot II produced 23.8 per cent more milk while fed alfalfa than while fed timothy. The average per cow for the eight weeks fed alfalfa was 1.475.1 pounds and for the eight weeks fed timothy was 1,191.1 pounds. 1,475.1—1,191=284.0 the difference, or loss by feeding timothy. 284.0×9=2,556 loss for the entire lot.

Assuming that this difference would be continued during the entire feeding season of about 6 months, or 25 weeks. The loss for lot 1 would be 3,836.2 pounds and that for lot II would be 7,987.5 pounds. 3,836.2+7,987.5=11,823.7 pounds or the loss for 18 cows during the feeding season. 11,823.7+100=118.24×$1.30=$153.71, this may represent the loss by feeding timothy hay, or profit by feeding alfalfa hay.

Let us figure it another way. The difference in lot I for the eight weeks was 1,227.6 pounds. This at $1.30 per hundred would be worth $15.95. This difference in lot II for the eight weeks was 2,556.0 pounds. This at $1.30 per one hundred pounds equals $33.22. $33.22+$15.95=$49.17, difference in eight weeks for 18 cows. About five tons of hay were fed during this period. $49.17÷5=$9.83, the difference in the value of the hay per ton for milk production, when milk is worth $1.30 per hundred pounds. If the milk were worth $1.00 per hundred the difference in the value of the hay would be $7.56. With another herd of cows these figures might be either larger or smaller.

$153.71, the gain by feeding alfalfa over timothy is equal to 6 per cent interest on $2,573.00. That would be 6 per cent interest on the money invested in 51 cows at $50.00 each.

The great objection raised by farmers is that they can not raise alfalfa. They have not yet tried thoroughly. If alfalfa can be successfully grown in Southern and Central Illinois and also in Southern Wisconsin and can not be grown in Northern Illinois, it is not a question of climate but of soil conditions which can be remedied. If alfalfa can not be grown, grow clover, either red or alsike. If these can not be successfully grown, grow soja beans or cow peas. There are few if any sections in Illinois where none of these crops can be grown.

If three tons of alfalfa can be raised per acre and two tons of timothy and if timothy is worth $12.00 per ton, then one acre of alfalfa is worth $41.49 more than an acre of timothy when milk is worth $1.30 per hundred and $34.68 when milk is worth $1.00 per hundred.

$153.71, the difference in profit on the 18 cows would at present prices buy enough fancy alfalfa seed to sow 54.9 acres at the rate of 20 pounds per acre.

Besides the greater returns in milk when a legume hay is fed, the condition of the cow counts for much. At the end of each period the cows in the lot fed timothy were in poor condition. They had lost much flesh, the hair was rough and they were otherwise in poor physical condition.

A number of timothy fed cows were off feed more or less at different times. This did not occur with those getting alfalfa.

Those receiving alfalfa showed two or three slight cases of garget, probably due to heavier milk flow.

CONCLUSIONS.

1. In this case alfalfa hay was worth $9.83 more per ton than timothy.
2. If milk had been worth $1.00 per hundred pounds, alfalfa would have been worth $7.56 per ton more than timothy.
3. Cows fed alfalfa kept in much better physical condition.
4. No one can afford to feed timothy hay to dairy cattle.
5. The superiority of legume roughage warrants greater effort in its production.

ADDRESS BY PROFESSOR C. E. LEE, OF THE UNIVERSITY OF ILLINOIS, ON THE SUBJECT OF BUTTERMAKING, BEING INCLUDED IN THE SUBJECT, "THREE WAYS OF IMPROVING ILLINOIS DAIRYING," GIVEN BEFORE FARMERS' INSTITUTE, PEORIA, ILLINOIS, FEBRUARY 13, 1908.

MR. CHAIRMAN, LADIES AND GENTLEMEN—I always come in on the last end, because we must have the cows, and we must feed the cows before we get the milk. I want to say this: As a rule, I believe the farmer who is making dairying a study and is keeping good cows and taking care of them, is going to take care of the milk better than a man who simply milks cows because the calves won't take it all. Isn't that right?

What I am interested in, in my line of work is that we may produce a little better grade of product for our own tables. This is neglected in certain sections of our State. It is true that we are all producing milk that is a little unsanitary. In certain sections of this State fifty per cent of the milk produced is unfit for food for children. I think you would agree with me if you saw the condition in which it is delivered, to some of our factories. When we handle this valuable food product, let us take special care of it. It doesn't cost much more to do so. It seems a matter of habit. What we must have in the first place, in order to produce the best of milk possible, is a good healthy herd. Don't attempt to produce milk by cows that are in a diseased condition. Take care of your cows. Feed them on such feeds as will give the best results. We know that sometimes when cows are on pasture they will consume certain weeds that will taint the milk. Some of you may know that wild onion will impart a peculiar flavor to the milk. Some object to the flavor found in milk when silage is fed. There are three causes for tainted milk. First—taints due to flavors imparted by the animal itself, due mainly to food products consumed by the animal. Second—flavors in the milk due to absorbtion. Don't you suppose that we can tell—you probably can't. I couldn't if I was always working around cows. You allow a can of milk to stand in an unsanitary barn without ventilation and you will always find that the milk has the same odor. On a few of our farms where they only have three or four gallons of milk at a milking and then keep it for three or four days in the kitchen, I can tell that you had bacon for breakfast. You can't allow milk to stand any place. It's a wrong idea that so many have that you must keep milk in the barn in the winter to keep it from freezing. No need of it at all. It is just simply habit. Build a suitable milk house. It does not cost a great deal.

Now the third one, unsanitary conditions. How many of you will go home from this meeting and find your cows covered with filth. The udder may be dirty. You don't take time to wash it off. I have seen farmers sit down, and put a little milk on the teat and rub the dirt off. Observe some of these things and see if you can not improve. It will mean a whole lot to the State of Illinois. See that you are clean yourself before milking.

COLLEGE OF AGRICULTURE.
MARKET CLASS AND GRADE OF BEEF

Exhibit of University of Illinois, at Peoria Meeting.

Be sure that you have a pail that is clean. A farmer over in an eastern county was milking in an old axle grease pail. A man at Davenport saw him. Avoid the wooden and galvanized pails. Do away with them altogether. Buy the best grade of tin pails. See that all the corners are flushed full of solder. A cloth won't get in the corners, and that is what is commonly used in washing pails. Throw your dish cloth away and get a brush. Strain your milk thoroughly. Use a good strainer. It don't matter so much whether you use metal or cloth strainer if you take care of them. Strain your milk into the regular cans. Be sure that these cans are clean. The hardest place to keep a milk can clean is right underneath the breast of the can. Cleanliness is the main thing of the whole situation in handling milk. After you have got the milk in the can, take it out of the barn and place it in a tank of cold water, constructed for that purpose. Many say: We cannot afford to build a tank. We know we ought to have one. We cannot afford to build a milk house. It is not absolutely necessary to build a milk house. I have seen places in this State, constructed by the farmers that would answer the purpose. The best would not exceed five dollars. Get something that will hold cold water, and use plenty of it. The first hour the milk is in the water, stir it three or four times. At the end of that time, close the can up tight, and be sure that the water is kept cool. I can assure you that your milk will keep fairly uniform no matter if it is winter or summer, warm or cold. A good many farmers of this State say, you are mistaken when you say to us that you can keep milk in cold water, and keep it from freezing.

In the summer time the danger is to keep the milk from souring. If you will use plenty of cold water in the tank and not have too large a tank for the amount of milk you are keeping in it, you will have no trouble. I have heard farmers say that they keep their milk cans in cold water. I have seen them in the stock tank. The water wasn't changed once a week, and the water would be almost as warm as the atmosphere. That being true, how can you expect the milk to cool off. If you will fix up a small box in this water tank and construct it large enough to hold all the cans. All the water you pump for your stock, pump it into this tank, and pump it into the bottom of the tank, you will get results. Cool the milk as soon as possible, and keep it cool and there is going to be little danger of having milk that has got too many bacteria in it or that will sour too soon.

I would like to have talked about handling cream. That is one of our problems. We must make a better grade of butter. But unless the farmers improve in their methods, I don't see how there is much prospect in that line in the future.

THURSDAY AFTERNOON, 1:30 TO 2:45

Director A. W. Miner, Presiding.

Mr. Miner—We have with us Professor Dietrich who will talk to you on

CARE, FEEDING AND BREEDING OF SWINE.

Mr President and Gentlemen—I was asked to give an address at this meeting and supposed of course I would have a large audience to talk to, but a small appreciative audience is better than a large audience that does not appreciate what you are trying to tell them.

WILLIAM DIETRICH.

The subject was arranged with the idea of covering the whole field of swine husbandry; a sort of general discussion of anything that might come up; anything that anybody might be interested in.

I have prepared a chart. You see it outlines a number of factors that enter into the care, feeding and breeding of swine and I have tried to arrange these, roughly speaking and by estimate, in accordance with their importance as I see them.

To start out at the top of the chart, as you see, we have here this line to represent a finished market hog at eight months of age weighing 300 pounds. By eight months I mean the day they become eight months old. I don't take into consideration the rule adopted by the fair association where you can show a fourteen months old hog in the under a year class and a nine months old hog in the under six months class, when I talk about a hog eight months old. By taking this as a standard or ideal to work to, taking the average market hog as he goes to market, he should weigh 300 pounds at eight months. When you get there you can raise the standard a little and go higher, but it will be a long time before the majority can reach that high.

I have here a chart designating two special factors, special factors from two to six months. Of the two important factors to be considered at that age the most important is protein as the protein an animal gets in its ration at that age is more important than the carbohydrates. Now for those that are not acquainted with the term protein we will have to stop and define the term. You all know the white of an egg and that is almost pure protein. You all know lean meat when you see it. Lean meat is practically pure protein. Now it is the lean meat in the carcass of the pig that is the protein substance, and when you want lean meat in the pig, it must have protein in its food or else it cannot build up the protein material in its body. That is one of the rules of animal nutrition—that is, that an animal cannot construct it in the body out of any thing except protein in its food. So this is one of the fundamental factors that have to be considered necessary that you furnish the animal with sufficient protein so it will grow this lean meat protein in the carcass. If you do not have that it can never grow to any size.

Delegate—What would be the easiest food to get that in for the average farmer.

Prof. Dietrich—Protein is found in the foods raised on the farm as follows: The best, perhaps, you have on the farm is skimmed milk. Skimmed milk is a nitrogenous food. It contains nitrogen principally but has other elements.

Delegate—Where you raise many hogs you don't have the skimmed milk.

Professor Dietrich—That is true, but everybody can raise clover. A good many people could raise alfalfa, but when you see these two they are bulky foods and there is a large bulk for a given quantity of digestible nutriments. Consequently pigs cannot get enough for a maximum growth. So even if we have corn—corn is rich in carbohydrates—(it has nine-tenths carbohydrates)—it contains some protein. It is very fortunate it does or else the pigs would starve to death when fed corn. It has enough protein so they can live.

Delegate—How does oats compare with corn?

Prof. Dietrich—Oats has a little more protein than corn but still not sufficient. If you have corn and clover, corn has a little protein and clover has more but not enough. It is still necessary for a young pig to grow to have some protein food—cow peas, soy beans or Canada field peas. The Canada field peas are as good as the cow peas. Any of the three are good for such purpose and there is nothing better grown on the farm to balance up the ration.

Delegate—Do you know of any one in Northern Illinois growing Canada field peas?

Prof. Dietrich—I don't know any one but I think they could be grown. This is pretty far south for Canada field peas but up in Wisconsin they raise fifty bushels to the acre.

Delegate—What about rape?

Prof. Dietrich—It is a bulky feed. It contains a large part of water and fibre and the nutrients are there as in corn. It is fattening. So if you want to get the best results it is necessary to feed nitrogenous feeds with them.

You can use clover hay in winter and feed it green in the summer. They won't eat as much dry in winter as they will green in the summer. If you feed it in racks they will not eat as much of it as if it is chopped up fine as you can, scalded with steam and mixed with the slop. We are feeding old sows. A mature sow does not need as much protein as a growing pig. Our old sows are getting corn for one feed and in the afternoon they get clover scalded with hot water and grain sprinkled over it. If you don't have sufficient protein out of the feeds named, if you don't happen to have any of these for the rest of this year and you want to use some protein before you have time to grow it you can go to market and buy it. You can buy middlings, low grade flour, it has protein but not enough. Tankage, meat meal, blood meal are very much richer than shorts. Perhaps the most concentrated nitrogenous feeds we have is tankage. There is danger in feeding too much protein. It is worse than feeding too little. There is no quicker way of getting a pig off feed than feeding him too much protein.

Delegate—This spring I had about 150 pigs. I feed three tons of Red Dog meal. I never fed it before and I thought it took a lot of meal. I made it thin and I gave it to them and the pigs became not exactly sick but became runty and looked bad.

Prof. Dietrich—The trouble may have been that they got too much protein·

Delegate—They did not get much of this meal there was lots of water in it. What was the matter with my pigs?

Prof. Dietrich—We will cover that point before we get through. If I don't call my attention to it before I quit.

Take the other two months of a pig's life if you feed him to eight months; during this time carbohydrates or fattening feeds are of greater importance because the pig has gotton his growth and during these two months you want to put on fat. Now cattle feeders feed nitrogenous feeds just before they send their cattle to market. I have reversed that, feeding protein during the first six months and corbohydrates the last two months, feeding the last two months on corn with a little roughage and nitrogenous concentrates for the sake of getting better digestion. Of course, it is necessary to feed some protein at the close. I think it is better to use something besides corn as we get better results.

Now take the general factors I have outlined here as explained before. We have one on concentration and digestibility of the ration which is one of the greatest importance. Now, by concentration I mean what I have already spoken of under bulk. A concentrate is one that has a large quantity of digestible nutrients like corn or middlings. A feed that is not a concentrate, or a bulky feed, is one like clover with a large per cent of crude fiber, or skimmed milk that is largely water, or roots that has a small quantity of digestible nutrients for a given amount of feed.

We must feed feeds that are digestible. The whole grains like corn or wheat or the finer particles of the wheat grain like flour or middlings are very digestible, but when you come to a feed like bran which is much used for pig feeding you have one that is not so digestible. It is practically indigestible for the pig. Of course, a cow can digest more of it.

Delegate—How about oil cake?

Prof. Dietrich—It is a nitrogenous product. It contains as much protein as middlings and ranks in the same class as meat meal, blood meal or oil meal. The oil meal perhaps is better because it contains much other extract.

Compounding and feeding. By compounding I mean the mixing of the feeds. Now it is a general practice among feeders, quite general, that they do not mix their feeds. They feed shelled corn or ear corn once and feed some thing else another time. I will give you an illustration of what we have done. In one experiment we got a good lesson out of this. Henry up in Wisconsin, in his work on shelled corn versus ground corn, has concluded that the ground corn is better than the shelled.

We thought by feeding them shelled corn they would eat it slower and secrete more saliva and digest it better, and that eating it slower would allow more water to get out of their stomachs so they could eat more. We started out to make a slop of middlings and tankage. We don't have skimmed milk. We have to use tankage, because we don't have an opportunity to grow our protein on the farm. The pigs ate the middlings and tankage and when we went the second round some of them would not eat it, they would be satisfied after they ate middlings and tankage and go back to their nests. It went on this way for one or two weeks and we thought they would get used to it but they did not. They were fed on ground feed before this experiment started and they were not used to eating shelled corn and did not like it. We mixed it up with the slop but they did not do well and began to get runty and some of them died. We found they did not digest the food and we started then on cornmeal, middlings and tankage but the results at the close were different. In the other experiment we had a weight of 280 pounds. In this experiment they weighed 192. What was the cause of it? Those pigs never made the gain they ought to throughout the experiment. It was this. During the first three weeks they were fed these middlings and tankage separate in the form of slop some of them ate faster and ate too much. You know that some pigs eat faster than others, and we only had ten pigs in the lot. If we had had more it would have been worse. The pigs that ate faster ate too much. They, getting filled up with protein, lost their appetites. The slower ones came in and ate the balance that the fastest eaters refused to eat and in that way all the pigs in the lot were getting too much protein. Too much protein is worse than too little as too much protein sets up in the animals a factor of waste that will stay by them until the pigs go to market and would have the effect of reducing the final live weight. I can illustrate that by a chart I have down here.

Here is the data of another feeding experiment where we started with pigs giving them the normal amount and gradually reducing the feed from day to day running from 2 down to 36. You will notice they were fed that for five days steady. Here they weighed 36 5-10. Those pigs made a gain of a quarter of a pound. Here we went on further .7, .6, .5 and got down to .4, just half as much as they got there and during this period of only .4 you notice 49.25 here and 49.75 there. In other words, when we took away just half of the feed we got twice as much again.

Delegate—Better take it all away and get all gain?

Prof. Dietrich—You see now that this is an exact fact that we fed half as much food and got twice the gain which illustrates that there is danger of feeding too much. By getting down to maintenance by that process that excess of protein is eliminated. Something takes place in the carcass of the pig that makes the ration more available for producing gain, so that factor of waste can be reduced. It takes about a month to do that. We don't ordinarily feed pigs for that.

Delegate—Some of my neighbors fed shorts and the shorts were not good probably from that reason that they got too much protein?

Prof. Dietrich—Yes, sir.

Delegate—Can you over-feed pigs on skim milk?

Prof. Dietrich—Yes, sir.

Delegate—I have had a little trouble that way.

Prof. Dietrich—Skim milk is a nitrogenous product and is a good appetizer.

Now as to the feeding of ration. How are the pigs to be fed? Those two factors go together pretty well. If you compound the feed there is practically one way to feed it. You have necessarily got to feed at once, twice or three times a day. How are you going to feed it? Some people feed once and some three times a day. I ran an experiment this last year and I found I got better results where I fed three times than where they were fed twice. Bear this in mind. I do not mean to feed three times a day and give all they will eat, because then they will eat more feed and the gain will cost more. But if you feed the proper amount and do not feed too much and feed them that in three portions three times a day you will get larger and more economical gains.

Delegate—Suppose you have got a hundred head of hogs on the floor?

Prof. Dietrich—If you spread it out so all can get to it you can regulate it. It is more difficult to feed a large bunch than it is to feed a small bunch.

To come down to the practical part of this you must balance this with some nitrogenous concentrate. I know of no better way to do this than to feed cow peas, soy beans or Canada field peas in the shuck, have them simply harvested.

Delegate—Feed green?

Prof. Dietrich—Dry or green either so that the pigs have to do their own shelling and while they are doing that all of the others are doing the same thing and the rapidity of their eating is not so great. You should find out the proportion to be fed. I think you should find the proportion of protein to be fed in proportion to the amount of corn that they get.

Now the thing to bear in mind in this whole thing of compounding and feeding rations is to compound it and feed it in such a way that each pig in the bunch will get its amount of protein as well as the carbohydrates. Now you can do that dry or wet or in form of tankage or soy beans or cow peas. My opinion is that one feed is as good as the other so it contains a concentrate and nitrogenous product.

Delegate—I would like to ask what would be a good average pig from three and a half to five months old on a good system of feeding?

Prof. Dietrich—Now I have outlined that a pig at eight months old should weigh 300 pounds. There are not many that can do that. In eight months, 240 days you have a pig weighing considerable over a pound a day for the time of his life. Of course during the first three months the gain is not so large. We find that a two months pig will not weigh much over 30 pounds; a three months old pig will weigh any where from 50 to 60 pounds. We have had a bunch of pigs that made an average of two pounds a day for six or seven weeks that is from six months to eight months.

Delegate—Now I have seen a statement in the agricultural papers that a young animal can be fed with greater profit than an older animal. I have found that in my experience that is not so.

Prof. Dietrich—Here is a man that finds he can not feed young animals as profitably as he can older animals. I think that is not generally true and I have this very nicely illustrated on this chart. This represents the weight of the pig from the time it is born until it is eighteen months old. These vertical lines represent months. Why is a young pig's growth so small? Simply because the pig is small. You can't thresh as much wheat with a twenty-four inch cylinder as you can with a twenty-six inch cylinder. This line represents one hundred pounds; this one three hundred pounds; and this upper one four hundred pounds. You see when a pig is three months old he weighs fifty pounds and when he is four months and one week old he weighs a hundred pounds. At five months he has gained fifty pounds —fifty pounds in about three weeks. At seven months he weighs about two hundred and fifty pounds. Now where are you? You see now you have put on a hundred and fifty pounds of pork in three months. The next fifty pounds it takes two months to put on. How about the last hundred pounds. He puts on fifty pounds from nine months to twelve months. You take the Southern Razorback and turn him out in the mud and you could not do that. You see a pig taken from the beginning has made the greatest gains and the most profitable pork.

Now what do you feed it? This represents when it is three months old it eats 2.2 pounds of feed per day. When he gets over here at seven months he eats 6.6 pounds of food per day. You see he eats three times as much here as he did then in absolute pounds but how much difference in the weight. Here he weighs fifty pounds and here he weighs 250 pounds. He weighs five times as much here and eats only three times as much. The young pig eats more feed than the older pig. The more feed he eats the smaller relative amount he uses for maintenance and the larger the gain.

Delegate—Do you mean more food in proportion to the live weight?

Prof. Dietrich—Yes, sir; that is the only way to figure feed. You see if a hundred pound pig eats four pounds and a fifty pound pig eats two pounds of feed both eat the same quantity because it has to be fed accordingly to live weight.

You see between four and five months the pig is making fifty pounds gain in thirty days.

Delegate—On how much feed?

Prof. Dietrich—Four pounds of feed for thirty days makes how many pounds of feed—one hundred and twenty pounds of feed makes fifty pounds of pork. How much does that cost you? Going back here after you pass nine months it takes from nine to twelve months of age to put on fifty pounds and they are eating more than seven pounds of feed. Seven pounds of feed for ninety days makes how much? Which is the most economical?

Delegate—On the most feed of course you get the most manure?

Prof. Dietrich—That is all we have left here.

Now we have feeding and care of the dam and sire. A young hog I said always needs more protein than an old hog. That applies to young sows and young boars and that applies to children. It applies to calves and sows and colts and horses and all manner of live stock. Now an old hog that has come to maturity is not growing and needs less protein. If you have a young sow that is to be bred and produce a litter you must feed her considerable protein to grow her body and at the same time grow the litter. The old sow must have some protein but not so much. A sow should always be well fed. Any hog that is growing should be kept in good condition but perhaps the most important point in feeding the sow is immediately before and after she farrows. She should be fed sparingly just before farrowing and after farrowing. Before farrowing if she is fed heavily she is likely to get milk fever, or, if she gets too fat before she farrows she will not have sufficient strength for farrowing. So we always cut down the ration before she farrows and after she farrows. Many people make a mistake by getting her on full feed too soon. The first day she gets nothing; not much the second day; not very much the third day and even for three or four weeks she is not on full feed. A sow should not be gotten on full feed until the pigs are four weeks old. When pigs are first farrowed they are little fellows with small stomachs and a sow has a large quantity of milk and the pigs can't take it and you have trouble with a caked udder. Start sparingly the second day; feed a little more the fourth day and keep increasing until the pigs are four weeks old and you have her on full feed. We have young and old sows and they keep developing and we have had sows that were heavier when they weaned their pigs than at the farrowing time. A young sire should be fed so as develop him. An old boar does not need to be fed so much and should be fed relatively less protein except in the breeding season, but when they are in service they should have good feed so they can do good work.

Delegate—What do you call good feed?

Prof. Dietrich—Just enough to keep them in good condition.

Delegate—How much corn do you consider a feed for an old sow?

Prof. Dietrich—I don't know. It takes about one pound of grain for each hundred pounds of live weight. Your four hundred pound sow could be kept in good condition on four pounds of feed.

Delegate—How fine do you have your clover cut?

Prof. Dietrich—We cut it as fine as we can cut it. We have it cut so fine it looks nearly like it is ground.

Delegate—What do you feed your sows after farrowing?

Prof. Dietrich—The same as before only less feed. We use corn, red dog flour and tankage. This winter we have a few roots, mangel wurzels.

Delegate—Do you think as a rule that oats is a good feed?

Prof. Dietrich—Whole oats is a good feed, but you get enough more out of it by grinding it to pay for the grinding. If you feed it out on the ground you make the sows take more exercise. We get our exercise in a different way. We put the cots in the back part of the pasture and feed in the front.

Delegate—Can you tell me which is the best for the farmer, meat meal or Swift's tankage.

Prof. Dietrich—I don't know. We don't know as much about those feeds as we are supposed to. I think our station is the first station that ran an experiment on digestion with tankage. Taking sixty per cent protein I find it contained about forty-six per cent of digestible protein. It contains sixty per cent but it is only partly digestible.

Delegate—How about rye?

Prof. Dietrich—It is not a nitrogenous feed. It contains a little more protein than corn.

Delegate—How is barley?

Prof. Dietrich—It is one of the best feeds you have on the farm. It contains more protein than rye and the Danes find it is the best single feed for bacon.

Delegate—You say that Swift's tankage has only forty-six per cent of digestible protein? A. Yes, sir.

Delegate—What does oil meal have?

Prof. Dietrich—I don't know exactly. I am not using that. I should say not over 25 per cent.

Delegate—It is supposed to have 32 per cent?

Prof. Dietrich—That is the total composition. I don't think that there is over 25 per cent digestible protein. Those things are so incomplete in our tables.

Delegate—Do I understand you to say that oil meal is as good as tankage?

Prof, Dietrich—No, I don't know. It does not contain as much protein but it contains other qualities and oil meal can be bought for less money than tankage, but I don't know, taking the price in consideration, that oil meal is cheaper.

Why? A. Because the oil meal contains more carbohydrates, more oil. The tankage does not contain any carbohydrates.

Delegate—Suppose you are a farmer, can't you buy it cheaper in tankage than you can in oil meal?

Prof. Dietrich—I think you can.

The next factor we have to consider is the individuality of the feeder. That is important. You all know of men who can feed a pig to weigh 250 pounds at eight months where the neighbors' do not weigh over 150 and the success of the pure-bred swine breeders depends on the man at the end of the feed bucket. How does he do it? He does not know. It is simply the individuality of the man, he has it in him by nature and some with just as good brains and more can not do that thing. There are some fundamental principles of animal nutrition that must be worked out just right. Now that is the problem I am working on over at the University. I started out four years ago with the idea of making a feeding standard. In the first trial I fed several bunches of pigs. Lots five and six which were fed according to the old feeding standard, which you all know as scientific feeding, weighed 270 pounds at nine months. The others fed by my method weighed 298 and another 305. How was this done? By holding the pigs down at the beginning, feeding less protein. I said pigs eat too much at first. They will eat too much and that will keep down their weight for ever afterwards. So by keeping down lots 8 and 9 at the beginning in one experiment we got larger gains and not only that but the gain at the close was made off of corn meal which is a cheaper feed.

Now a few points about experiments as a whole. We have a few important factors to consider. A pig must have protein. It must have mineral matter or it cannot develop bone and a pig without bone would be like a wagon without wheels. A pig without bone and muscle would be like a wagon with no rack on it.

Delegate—I had a bunch of pigs taken with rickets. Was that the fault of the mineral matter in their feed?

Prof. Dietrich—It may be it was some mal-nutrition of some kind, too much carbohydrates or not enough mineral matter.

The pigs in lot nine started in the experiment when they were three months old, weighing fifty pounds and were fed until they were nine months old. In lot one the pigs had made a gain of twenty pounds; they had carbohydrates. The pigs in lot two were fed the same as in lot one. They had carbohydrates in the form of corn and had mineral matter in the form of air slaked lime, charcoal ashes, and a few loads of dirt. The pigs in this lot had gained 70 pounds. Then the pigs in these remaining lots had protein in addition to the mineral matter. The pigs in lot three weighed 240 pounds. This bunch of pigs were fed straight corn on clover pasture and made a gain which was two and one half times the gain made in lot two.

Now we have a number of other factors to consider which we will not have time to take up. We have just finished on the individuality of the feeder and this is the problem I am working on so that a man can put the ration together like taking three and three together and it adds six. Sometimes in swine feeding it only adds four. We cannot see why if we do certain things we get certain results, but when I finish my nine experiments I hope to be able to get out instructions so that any feeder can get the same results.

Shelter and care of the pigs, I have said nothing about and do not say much because any of you are interested in shelter and care of pigs can get Bulletin No. 109. I will say this of the kind of hog house. Any kind of hog house which furnishes freedom from drafts and gives sufficient light and dryness is all right. This shows an end view of a house. It is built with the idea of being cool in summer and warm in winter without artificial heat. You can get Bulletin No. 109 and study that out at your leisure.

Breeding is another factor that I have outlined here. Well bred hogs always give better results than scrubs.

External parasites. I can say in a very few words what to do for lice. Perhaps the easier way is to give them natural conditions—a good clean mud to wallow, and if you can't give them that you will have to resort to dipping or spraying. We have found that by giving them charcoal, air slaked lime and ashes that we do not have any worms. We have a trough that we put in each part by itself and let them help themselves.

Disease is the least important factor. If the hogs are well cared for and well fed there is not much danger of disease breaking out in the herd and a sick hog is the poorest property you can have.

Delegate—What about coal cinders?

Prof. Dietrich—He gets something out of that that he wants. I don't know what it is. We can find no trouble from it. We haul them in by the wagon load. It takes two or three loads per lot per season. They eat it like shelled corn.

How about coal slack?

Prof. Dietrich—It costs too much money with us. We feed it to the furnace but where it is available, I do not think I would feed it as it is constipating, but I don't see any bad effects from coal cinders.

Delegates—You have not seen any bad effects from them having ashes?

A.—No, sir.

Perhaps the worse disease we have today is tuberculosis. It is a disease that is rapidly increasing and it is bad to combat. The only way to kill out tuberculosis is to sell out.

Now gentlemen if there are no further questions for me to consider I will leave the floor.

Delegate—Now all these experiments to which you have referred have been dry lot fed? A. Yes, sir.

Delegate—What do you think of a self-feeder?

Prof. Dietrich—We have no experiments, but if a pig is under five months old he will eat too much. After that he will probably do better, but I have found this other factor that if he is fed all he will eat he will not do so well. I say a self-feeder is not best because you can get better results from pig feeding by hand.

Delegate—Do you think it is practical to feed stock foods or condition powders?

Prof. Dietrich—We have in this one experiment right here that I outlined, we got three and one-half times as much gain as we did right here by feeding wood ashes, air slaked lime and charcoal.

Delegate—Is there danger of young pigs getting too much nitrogen in clover? A. It is bulky and they can't get too much.

Delegate—Is copperas injurious?

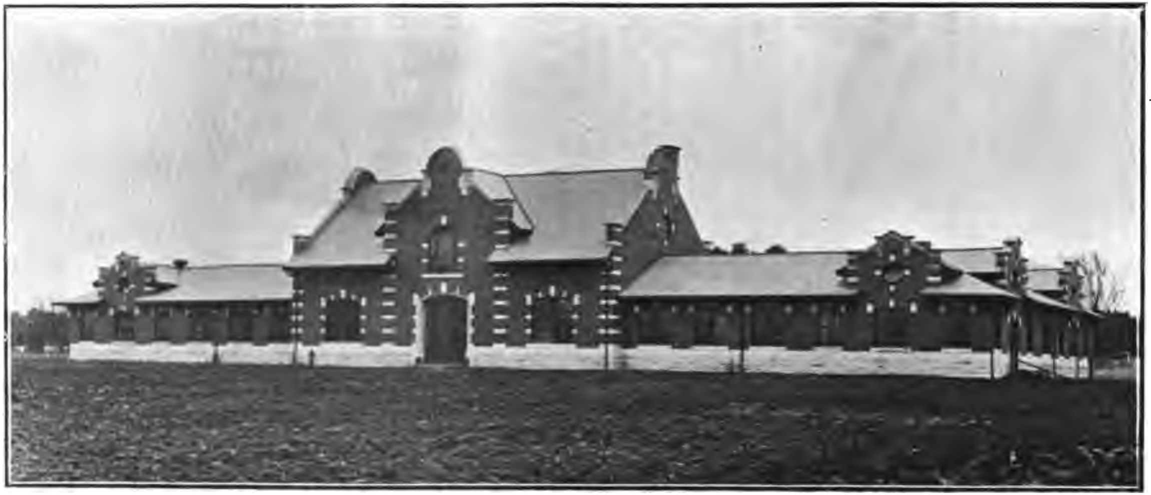
Prof. Dietrich—It is a poison. It is a substance used by doctors to counteract poison in the body. Unless we first make our hogs sick there is no use for copperas.

ADDRESS—LIVE STOCK.

(Illustrated by Steropticon) Mr. L. D. Hall.

Mr. Chairman, Ladies and Gentlemen of the Farmers' Institute—In the hour alloted to us this afternoon, it is our purpose to describe as fully as possible the experimental and instructional work of the Animal Husbandry Department of the University of Illinois. The work in animal husbandry, like that in agronomy, dairy husbandry and horticulture, is divided between the giving of instruction in the College of Agriculture and the conducting of investigations in the experiment station, so that each Animal Husbandry instructor in the college is also an investigator in his particular subject in the experiment station. The work is divided among the various instructors according to classes of live stock; that is, the instruction and investigations in beef cattle, their feeding, breeding, judging and management are entirely distinct from that in sheep, swine or horses and a different man is in charge of each of these interests. In this respect our organization is rather unique as compared with animal husbandry departments of other institutions.

Another distinctive feature of the teaching and investigation of animal husbandry subjects at the university is the fact that we approach them all from the market standpoint. We consider the live stock market the logical basis on which to proceed in studying live stock questions and the true criterion for permanent improvement, at least experiments in feeding and the instruction in stock judging deal not so much with show ring types of animals as with the standard classes and grades sold on the market. Bulletin 78 of the Illinois Experiment Station on market classes and grades of beef cattle by Professor Mumford was the first complete description and illustration of market classes of cattle ever published. It has been of immense value in attracting the attention of cattle men to the market phases of beef production and in giving definite shape to our instruction in the judging of commercial cattle. Besides this, it has been influential in rendering the live stock quotations of our markets more uniform and accurate—an improvement which will be appreciated by any one who reads live stock market reports. This bulletin has been followed by Bulletin 97 on market classes and grades of swine and bulletin 122 on market classes and grades of horses and mules. In a short time will appear another on the market classes and grades of sheep by Mr. W. C. Coffey, who speaks to you this afternoon. In the ex-



Cattle Barns, University of Illinois.

hibit of the University of Illinois in this building are shown enlarged photographs of the market classes and grades of cattle and of swine. On the screen this afternoon we expect to show similar illustrations of sheep, horses, mules and dressed meats.

As an example of the application of this classification to our instruction in animal husbandry, I may say that in teaching the judging of beef cattle a considerable portion of the time is devoted to the study of the grades of stockers and feeders, from inferior to fancy, a knowledge of which is far more important to the Illinois cattle feeder than an expert training in the judging of fat show steers. In other words, it requires more skill and training to select cattle intelligently for the feed lot than to pick out the best one in the drove after they are fat. And further, in the study of fat cattle it is of far more value to the average man to know how to tell the market grades of a number of bullocks from prime down to common than it is to know the fine points of a ring of highly fitted show steers.

All this is no reflection whatever on the art of judging show animals and I may say we give a course called "Advanced Stock Judging" for those students who wish to fit themselves for expert judges. A great majority of our students, however, choose to enter those courses in which the market classes and grades of live stock and their production are considered.

Likewise in the animal husbandry investigations of the experiment station the same idea has been carried out so far as the production of animals for the market is concerned. In steer feeding the object has been not so much to show how rapidly and cheaply cattle can be made to gain under ideal or abnormal conditions as to compare from the practical feeders standpoint the outcome of different grades of feeding and of different methods of feeding which are commonly used in this State. A similar point of view is taken with reference to the feeding of other farm animals in our experimental work.

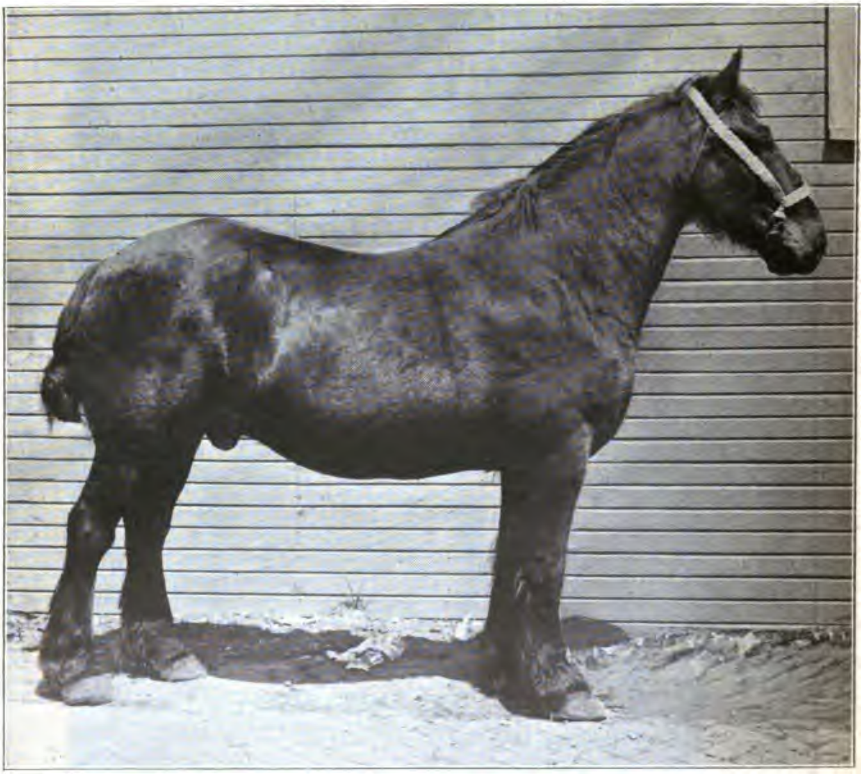
We now wish by means of the stereopticon to take you with us to the University of Illinois and show you how much some of this work in animal husbandry is carried on both at the experiment station and in the class rooms. I will ask your attention for a few minutes to the beef cattle division and to some illustrations of our work in meats, after which Mr. Coffey of the University will present the subjects of sheep and horses. As many of you have heard Professor Dietrich speak of the experiments in swine feeding this afternoon and have seen the pictures of market classes and grades of swine in this building we will have little to say in this connection of that important division of our department work.

[Mr. Hall then had about 50 views thrown on the screen explaining the significance of each as it appeared. The pictures illustrated the market classes and grades of cattle; feed lots and storage barns at the experiment station with carlots of experimental steers of various grades and ages; the new beef cattle building; the Shorthorn herd bull, Merry Hampton, and Shorthorn cows; stock judging pavilion with students judging specimen cattle; score cards and market report blanks; carcasses and cuts of beef, pork and mutton illustrating the wholesale market classifications of meat.]

Experimental Feed Lots, University of Illinois.

Prof. Coffey—Mr. Chairman, Ladies and Gentlemen, Mr. Hall has referred to me this afternoon as the sheepman and I feel more or less out of place in presenting the work that is being done in horses at the Illinois Agricultural College and Experiment Station. I am sorry, indeed, that Mr. Obrecht cannot be here to present his work to you, because I am sure he could make it much more interesting than I can, and I am sure again that he would be here were it not for 125 students who are daily taking work in the study of horses.

I have placed on the screen a picture of a light draft horse. It represents the type used in an experiment conducted during the winter of 1905-1906.



Choice Eastern Chunk or Light Draft Horse. Representative of the Type Used in an Experiment Conducted at the Illinois Experiment Station, Winter of 1905-6.

This experiment was conducted with twenty-two horses to determine the best methods of feeding to fatten them for market in a period of seventy days. Aside from the comparative results secured, the experiment was of great value in determining how well it pays to fatten heavy horses before placing them on the market. The average selling price of each horse was increased $48.51 over the cost through the process of finishing. The average gain for each horse was 151 pounds. Thus by a little figuring we see that for every pound of gain secured 25.4 cents was added to the market value of the horse.

Last winter, 1906-1907, Mr. Obrecht continued the work of testing methods of feeding horses to fatten them for the market and you may expect a bulletin before many months setting forth the details of this work.

There is now in press Illinois Experiment Station Bulletin No. 122, which discusses market classes and grades of horses and mules. It not only describes in detail the various grades in the different classes but it is also replete with illustrations typical of these grades. Mr. Obrecht compiled his bulletin chiefly from observations made upon the Chicago and St. Louis markets. These markets, as you know, are within reach of the horse producers of Illinois and hence the material in this bulletin should be of interest to you because it discusses the types of horses which you supply to these markets. It is my purpose this afternoon to give you an idea of the nature of the bulletin by having a number of illustrations from it placed upon the screen. I wish you to further understand that these illustrations are representative of the specimens used by Mr. Obrecht in his work in teaching market classes and grades of horses.

[Mr. Coffey then placed fifty pictures of horses and mules upon the screen and briefly discussed each relative to the requirements for the grade it represented.]

Sheep growing is one of the more important live stock industries in the State of Illinois. The latest year book of the Department of Agriculture credits us with less than a million head but this report, or any other printed, does not give us a true idea of the sheep industry in this State. I say this because there are great numbers of sheep and lambs brought in from the west and fattened for market that are never accounted for in the statistics of this State. Since in the case of a lamb, especially, the animal is in the hands of the Illinois feeder for almost half of his life, you can readily understand why I insist that we are sheepmen to a greater extent that statistics indicate, for, is it not just as reasonable to consider the man in Illinois in the sheep business who owns the animal for the last half of his life as the man in Montana who owns him for the first half.

I think I can say with conviction that there is a place for a few sheep on nearly every Illinois farm and I believe we shall not live up to our best opportunities as farmers until most of us practice keeping a few sheep. They destroy noxious weeds; they, by preference, range over the neglected places and thus turn what would otherwise be waste into mutton, a valuable product. Upon being questioned as to how he disposed of his weeds and succeeded in keeping his farm so clean, a gentleman replied, that he sold the weeds on his farm in the form of mutton at six cents a pound.

At the Illinois Agricultural College, we give the students an opportunity to study this class of animals one hour per day for eighteen weeks. The work embraces a study of market classes and grades of sheep, the various breeds adapted to the State, sheep feeding, general flock management and the production and marketing of wool. We do all we can in this course to give our students an idea of how to start in the sheep business because we find so many of our boys have had no experience with this class of animals and hence are timid in investing in them. We keep a flock of about one hundred sheep in which are specimens of seven leading breeds. We use them in class room work to illustrate the type characteristics of these breeds.

In the Experiment Station we have in preparation a bulletin upon the market classes and grades of sheep, which we hope to have ready for the press before next autumn. This bulletin will deal with the various classes and grades of sheep to be found on our large markets in much the same manner as Mr. Obrecht's bulletin on market classes and grades or horses deals with that class of animals.

During the past two years we have been feeding western lambs to determine the best methods of feeding corn to finish them in a period of from 90 to 100 days. In the winter of 1905-1906 shelled cron and alfalfa hay were fed to different lots in varying proportions. The object was to ascertain what weight of hay with a given weight of shelled corn would produce the largest and cheapest gains in a period of 90 days. I shall not take time to enter into

the details of that experiment but it may be of interest to you to know that the best results came from the lot that ate a comparatively large amount of corn and a small amount of hay.

This year we are preparing different methods of preparing corn for fattening western lambs. This involves shock corn, ear corn, shelled corn, corn and cob meal and corn silage. Clover hay is the roughage being fed in all lots. The experiment is in progress and we cannot safely predict the final results at this stage, but we hope to issue a bulletin within the next year upon this subject.

I wish to show you upon the screen pictures of some of the specimen sheep we use in class work. Also, some pictures we hope to use in illustrating the bulletin being prepared on market classes and grades of sheep.

Mr. Coffey then presented forty pictures of sheep and briefly discussed each.

THURSDAY, FEBRUARY 13, 1:30 P. M.

Director A. N. Abbott, Presiding.

"ALFALFA."

Delivered by Dr. C. G. Hopkins before the Farmers' Institute, Peoria, Illinois, February 13, 1908.

Alfalfa is a hard crop to start. It is delicate, it is tender, and to put alfalfa on ordinary land without any protection or any help is about like throwing four dollars an acre away. That is pretty nearly the case. I think that at least three-fourths of the alfalfa seed that is sown in this State is just the same as wasted.

To be successful with alfalfa on the ordinary lands we must make special preparation. We must enrich the land. We must give alfalfa the best possible chance to start with. If I wanted to sow it on sandy land, I would want to put on at least twenty loads of manure to the acre. Thirty loads would be better. When you are sowing land for alfalfa, you are not preparing it for one year. You are preparing it for ten years. You can afford to do almost anything to get it in shape. The land should be worked until it is free from weeds. You can't have alfalfa prosper with weeds and foul grass. They must be destroyed. Destroy them before you sow the crop. If you will have the land free from weeds, and the surface soil enriched so that the alfalfa will be well provided for during the first two years of its life, then it will usually take care of itself, so far as plant food is concerned. It gets its roots down below where any other crop has been. It draws up phosphorus and potassium from the lower subsoil. Alfalfa is a crop on which I don't advise using phosphorus, except possibly in getting it started. Afterward it is not necessary. It is well sometimes to use phosphorus with manure to get it started, but manure alone will give it a good start as a rule, if you put on twenty or thirty loads of manure to the acre.

If the soil is acid, you can test it by following the directions given in our Experiment Station circular No. 110. That gives the directions for testing the soil to see if it is sour, or acid. Put on plenty of ground limestone and manure, if soil is acid.

Be sure that the soil is not sour, be sure that the land is free from weeds and foul grass; be sure that it is enriched sufficiently to sustain the alfalfa for years at least, using manure enough for that; see that it is inoculated so that the proper bacteria will be there to enable the alfalfa to get nitrogen from the air.

Question—Is it well to put manure on alfalfa after you have a stand?

Answer—Yes, if necessary. I would use rotten manure, free from weed seeds. Guard against getting weeds in the alfalfa. They crowd it out. And blue grass also is especially bad.

There is another thing; we must get the nitrogen from the air because alfalfa takes more nitrogen than any other crop we grow. Clover hay has forty pounds of nitrogen to the ton, and alfalfa has fifty pounds. It is a quarter richer in nitrogen and protein than clover is and yields twice as much hay during the season, but it gets nitrogen from the air. The nitrogen is not breathed in through the leaves. It must get it through the soil. Consequently, the soil must be open and porus. That is one reason why we

Part of University Exhibit at 13th Annual Institute Meeting, Peoria, Ill.

disk alfalfa after the first year, and usually after every cutting. At first, if the ground is hard, set the disk, not too slanting, so that it won't cut off the crowns or roots. Disc it twice, if necessary. You can set the disc pretty straight the first time—it will loosen the ground up a little. The next time you can set it at a sharper angle. The ground is loose and the roots will push away.

There are two objects for this: First, we loosen it up so that the nitrogen will enter the soil, and the bacteria will take the nitrogen out of the air and feed it to the plant. Another reason is that it will root out blue grass and other foul grass and weeds that will creep into the alfalfa field. Take blue grass that has but a little start, or young weeds, or other sorts of grass and the disc will root them out, but it won't kill the deep rooting alfalfa. By that means we can cultivate alfalfa right along. It should be cultivated in the spring. Cultivate it after you have taken the first cutting off. Early in the spring you have other things to do, and the disking is likely to be delayed, and the alfalfa is liable to be ten inches high before the ground is dry enough, so that in common practice we do not disk before the first cutting is harvested.

Question—What is the economical and sure method of inoculating the soil?

Answer—The best method is to use infected soil. Soil that has bacteria in it already that you can get from an old field where it has been growing several years, or that you can get from an old patch of sweet clover. The best way is to get infected soil and sow it in at the time you sow seed.

Question—How much to the acre?

Answer—A wagon load, if you can get it, to the acre. The more you put on the better, but a wagon load to the acre of well infected soil gives very good inoculation.

Question—How would it do to sow sweet clover seed the year before, where you want to sow alfalfa; that is, with the idea to get bacteria to develop?

Answer—Why should you sow sweet clover without inoculation any more than alfalfa? In other words, it is assumed that it would develop bacteria itself. We have sowed sweet clover right out on the ordinary field and inoculated one-half and got just twice the yield of sweet clover where we inoculated. There is no more reason to expect bacteria to develop out of nothing than to get sheep on the land without any start. They are individuals that have life and being. We have never yet found that beings develop from nothing. We have heard of cases where wheat turns into cheat.

Question—Will it do to inoculate land with with infected soil where alfalfa has been sowed a year or two before?

Answer—Possibly you can save your crop by inoculating, but that isn't the best way to do. The way is to put it in so the bacteria will be in the soil when the seed germinates.

Question—How close should it be mowed?

Answer—Ordinarily as you would mow any meadow. Down pretty close.

Question—What is the effect of dodder on alfalfa?

Answer—To kill the plant, if it goes very far. If any dodder developes, it better be destroyed, even if you have to plow up the field. It ought to be watched carefully. You may sometimes get dodder seed with alfalfa, may be only a half dozen dodder seeds will come in a bushel, but, if you find it, the thing to do is to take that plant out and burn it. Dodder starts from a seed, which germinates in the soil, and as soon as it comes up and begins to grow, it encroaches on the alfalfa plants. It has suckers which fasten on the plants, and after a while lets loose from the soil and lives only on the alfalfa plant.

I might say that I think the best time to sow alfalfa is not in the spring. If you have good land, clean, and rich land, you may succeed if you get it in shape in the spring and seed it the last of April, but from a good many years' experience we advise sowing alfalfa between the middle of June and the middle of August. Have the ground well drained and made rich the year before. Plow the ground in the spring at the time you would for corn. Then disk it or harrow it about every week or ten days, until you are satisfied that the weeds and foul grass are started and killed, and that the land is practically clean. If this takes until the middle of August, why work it until then. Don't prepare the land in the spring and then sow it immediately, as all sorts of weeds will spring up with the alfalfa. Keep working it. When they come (the weeds) kill them with your harrow. In a few days there will be another crop of weeds spring up. Go on with your disk and harrow, and let them come up as long as they will, until you have them about all started and killed. Perhaps by the middle of July you will have the land clean. Now you have done two things—you have killed the weeds and conserved the moisture. By that means you can have a moist soil even in a dry season—even in the middle of July if you want. Then thoroughly inoculate the ground, sow twenty or twenty-five pounds of good alfalfa seed, and harrow it in well about the middle of July.

I can't tell you any more certain way than this to get alfalfa started. But I don't think that is the most practical way. I don't believe it is necessary to give up the use of your land. I think after you have succeeded on a few acres, and have found that you can raise alfalfa, the plan you will finally adopt to get alfalfa started will be to take a field that has been in winter wheat or clover. Then, after harvesting the hay or grain, immediately plow it, work it a month, and sow it about the last of July. If you have harvested the clover hay crop, then you can give up the land the last half of the season to get the alfalfa started. When you get to growing it on large areas, I think that is the way you will put it in. That is not absolutely the surest way. The surest way is to start work on the land earlier in the spring, as already described, but it can be put in after wheat or clover have been harvested. After the oats crop, it is getting too late. You won't get your oats off until the 20th of July, or maybe the first of August. The winter wheat is better, because you can get it off earlier. I like clover hay the best of all, if you are going to have a previous crop. In the first place it helps the land, and it is a good thing to put alfalfa after clover on that account. Your land is in pretty good condition to start with, and you can harvest by the middle of June, and you take clover hay off the land soon after it is harvested. If it is a little dry put a disk on and disk the clover ground after you have gotten the crop off, and then it will become moist so you can plow in two or three weeks, even with no rain.

Question—Why do you put on so much seed?

Answer—Because it is the experience of the country generally that we should sow at least twenty pounds of alfalfa seed to the acre the first time you sow alfalfa. After you have raised alfalfa on the land and have plowed it up and have gotten it thoroughly inoculated that way, then fifteen pounds of seed does very well—a bushel to four acres. Less than that is pretty light seeding. But to start with that is not sufficient for the best results. You can't inoculate very thoroughly. Remember that one little tubercle on one little root of alfalfa plant may have a million bacteria in it. Bacteria help it. The chances are that with a wagon load of infected soil to the acre a third or a half of all the plants you start won't have tubercles on the roots to start with.

Question—How long will the soil stay inoculated?

Answer—I don't think that can be answered absolutely. We don't have complete information, but so far as I am able to judge the bacteria will live in the soil about as long as there is any decaying alfalfa plant residue left, and that will be probably for four or five years. We have evidence that bacteria will remain in the soil virile and strong and grow upon the plants for four or five years, and beyond that the evidence is they begin to get scarce.

If you should scatter the infected soil out over the land in the morning on a bright sunny day in July, and let them lie there all day most of them (bacteria), will be killed before night. Don't scatter infected soil over the land and let it lie for many hours in the hot sun. Ladies learned long, long ago to put the milk cans out in the sun in order to sterilize them. They did not know perhaps just what action was wanted ,but they thus destroyed the bacteria they did not want to sour the next lot of milk.

Question—Is there any danger of getting the sweet clover by using sweet clover soil to inoculate with?

Answer—You are likely to get a few seed, but you don't need to get very many. If you will scrape off half an inch of soil from the surface and then plow a furrow three or four inches deep and take that plowed soil you are not likely to get many seed. There is not much objection if you get a few seed. Alfalfa is a perennial plant—it lives many years. Sweet clover is a two-year plant, or a biennial, and ordinarily we mow alfalfa three or four times during a season. If you do that, it is quite likely the sweet clover plants will not have time to go to seed. If you cut alfalfa that way for two or three years, even if you do have a sweet clover plant in the filed it will be dead—it won't live that long. Alfalfa lives on and on. Alfalfa is benefitted by nowing almost always. That is a remedy for some of its troubles and next to that is to disk it. If it doesn't do well mow and disk it. The sweet clover plant itself won't live over two years, ordinarily. It will go to seed and the new seed will come up and thus may live always. But if you take a green plant and cut it down regularly for two years, normally that plant will die. Possibly once in a while it will live three years, probably not more. Red clover is the same way—it is a two-year plant. If you sow clover with the oats, it will grow the coming season, and the next year it will make a hay crop in June and then make a seed crop later, and at the end of that season, after the original plants die, you harvest the crop of seed normally. Some won't sprout the first year, and are buried until the second year. They then live over until the third year. Thus you might think the plant lives three years, but it does not ordinarily. Possibly there are a few plants that will live three years, but normally sweet clover and red clover are two-year plants, and at the end of the second year we may expect them to die.

Question—Are bacteria generally found where sweet clover grows?

Answer—Ordinarily they are. Along your roadsides you have seen sweet clover. Commonly you have found sweet clover starts from town and gradually extends out the country road. The seed rolls out on the wagon wheels. The dirt rolls on the wheel and carries the bacteria with it.

Question—How do you account for getting seed in the first cutting of the clover crop—sometimes red clover?

Answer—Normally, seed would always develop; that is, if it is well fertilized by bumble bees. The red clover flower is complete in itself. It doesn't have a tassel and then a silk, separate male and female parts of the plant, as with corn. The clover flower is complete. The pollen is developed in the outer part and the ovule, that which makes the seed, develops down in the lower part. If there are no other flowers that will furnish honey, some of our ordinary honey bees will fertilize red clover, although they don't like to get honey from red clover, because their bills are not quite long enough to get honey from red clover with very much satisfaction, while the bumble bee seems to prefer the red clover blossoms.

Another thing about this that men ask sometimes. They question the work of the bumble bees. They say there are not bumble bees enough to fertilize the clover. You watch the bumble bees when the second growth of clover is in bloom. You can watch about a square rod. Take your watch in your hand and see how many bumble bees work on that square rod, and see how many dives one bee makes a minute, and figure how many seeds he would fertilize if he works from five o'clock in the morning until seven at night. I have counted thirty-five dives a minute for the bill of one bee.

Alfalfa won't grow under such conditions as sweet clover, because sweet clover is a hardier plant and will crowd out blue grass and most other plants, if it gets a chance. Ordinarily, on land that is adapted to sweet clover, if it is properly cared for and you get rid of all other plants alfalfa ought to grow successfully.

Question—Has sweet clover any value?

Answer—Sweet clover has a high value. It is not as valuable as red clover or alfalfa for feeding purposes. One of the chief purposes it is good for is fertilizing the soil. Sweet clover does make an enormous growth. We are experimenting with it as a fertilizing plant. I think it is a very promising crop. We don't know just the best time to sow it and the best way to handle it.

Alfalfa is richer than red clover. It is unquestionably the best forage plant that grows. It is worth more ton for ton than any other forage plant, so far as is known. Alfalfa hay is not easily spoiled. Ordinarily alfalfa hay will probably stand two or three times the amount of rain that red clover will stand. When red clover gets a rain on it, it gets dusty. That is due to the nature of the stem, which does not obtain in the case of alfalfa, so alfalfa does not get in such shape. All kinds of stock use alfalfa—horses, cattle, sheep and hogs, and they will eat it in any form. Hogs will eat it in hay form in the winter time. I do not feel that I am an authority on the feeding value of alfalfa, because it is my business to fix the soil so we can grow it, and others study the feeding value and can tell you more about that.

We have two bales of alfalfa here that represent results we have gotten from the ordinary corn belt land. The one is a bale that comes from the ordinary land without inoculation. That represents the amount from a certain sized tract. The other, twice as large, represents the quantity from the same area with inoculation. Otherwise it is absolutely the same. In other words, we more than double the yield by inoculating the alfalfa so that it can get nitrogen from the air. That information you will find in Bulletin No. 76, "Alfalfa on Illinois Soils," which is now in the third edition and will be sent to anyone who asks for it.

THURSDAY AFTERNOON, 3:00 TO 4:15 P. M.

Director J. B. Burrows, Presiding.

POULTRY.

Director Burrows—This section has often been put to one side, but this year we have been given a place along with swine and crops of all kinds, and in selecting Mr. Miller Purvis, editor of "Poultry," we thought we had provided you with a high class speaker, but for some reason he is not with us. Mr. Leland, a member of the State association, expected to be here today, but he was called home. Mr. Heyl, a graduate judge, is here with us and will be able to answer your questions. You know that the success of a meeting depends on the county management. The American Poultry Association now know as never before that what they depend on is the success of the county meetings or shows. There is something wrong with the State show and we thought we could get some light. I will call on Mr. Ira Cottingham, who has had some experience in work of this kind and he will be able to answer any of your questions.

Mr. Ira Cottingham—My friends, I am sure I hardly know how to take this matter up, because I had intended to go over and hear Dr. Hopkins talk. I have a talk and some charts I use, but I don't know how to commence on this. There are not very many here to get much out of a man when he is not prepared, but I will try to do the best I can.

This is certainly a subject we need to study. It is one of the main things we have on the farm when you need dollars and cents, and if you only knew the amount of dollars and cents there is in poultry you would take more interest in it. I believe we are not giving it the amount of attention it deserves. I am sorry that Mr. Purvis is not here to talk to you. He has spent much time in writing on this subject, while I have been carrying the bucket out on the farm. It is suggested that you ask questions, and perhaps you will get more out of it that way; and if you will take hold I will be glad to answer you, and if I can't give you an answer perhaps Mr. Heyl can.

Delegate—Have you any special breed?

Mr. Cottingham—I am not here to advertise any breed. If you have got any breed you would like for me to talk about I will be glad to talk about it.

In regard to the breeds, I might say that the main breeds on the farm are divided into three different divisions—Asiatic, American and Mediterranean.

The Americans are the Plymouth Rocks and the Wyandottes. As a general thing on the farm, it is well enough to stick to the old breeds and leave the fancier to bring the other breeds up; but the average farmer had better stick to the older breeds.

The Mediterraneans are the Leghorns and Minorcas. They are the same thing for eggs as Jerseys or Holsteins are a special dairy breed. They produce eggs, but when you want meat you had better leave them alone. But if you want meat, take the Asiatic, to which belong the Cochins and Brahmas. But I think on a farm the American breeds are the best.

Delegate—What do you know about the Orpingtons?

Mr. Cottingham—I know very little personally about the Orpingtons. I have handled most of the other breeds. But people are very enthusiastic about them. It is not as large as some breeds, but gets to a fair weight, and they are very good layers, but they are a new breed. When we start out to breed a new breed we have trouble in mating to do the right thing. and the farmer has no time for that. You had better let the fancier carry them up until they get them better established.

Delegate—What do you think about the Rhode Island Reds?

Mr. Cottingham—They are a new breed, and I have lots of friends who are very enthusiastic about them.

Delegate—In selecting the breeding pen, would you pay more attention to the score card or to egg production?

Mr. Cottingham—Now, they call me a little bit of a crank on the score card. In all breeds of animals I have gotten it into my mind that the score card has done injury to the farmer, and in hogs I am positive about it; and in the talks about the institutes I am afraid it is doing the same thing along the corn line, and I think they follow the standard a little too closely to get the best results in poultry for the family; that is, on the farm. What do you think of it, Mr. Heyl?

Mr. Heyl—I think the score card is a good thing for the amateur, to show what quality they have if they do not get within the limit of the prize list; to know how near they are. It is a little different from the score card on hogs or on corn. We have the American Standard of Perfection, which gives an illustration of the shape and lays down every section of that breed and shows the disqualifications and gives instructions to judges, and in that way if a qualified judge applies himself to the standard and will let the standard be his guide, they cannot go far from giving an accurate score of that fowl, and it should be placed first, although I have seen in these shows where the best fowls did not win. But it was the lack of qualification of the man who used the card. I believe that the time is coming when we will not use cards in the larger shows, as we do in the smaller shows, because it takes more time to do it than it does to pass upon them in comparison. In the past two weeks I have shown at the Indiana state show, and they have grown to such numbers that they require six or eight judges, and it would take perhaps the entire week to judge them.

Mr. Farr—I am after a breeding pen for next year. Now, I want to know whether it stands me in hand to select my breeding pen by the score card or by their egg production.

Mr. Heyl—You would have to base your judgment on what breed you want. There are varieties that are non-sitters and lay and there are other varieties that are both layers and sitters. You can't use the score card in that particular reference, but if you are going to buy and you cannot go to see them, you have to rely upon the score card.

Mr. Cottingham—This gentleman asked whether the score card could be relied on for the farmer. We have been studying a great while how to select show ears of corn, and another man comes along and shows a plan to produce corn for a greater yield, and he shows parts of ears that have yielded two and a half times as much as the other. Which is the best for the farmer to use?

I do believe that the score card has done the hog industry a good deal of harm. We follow too much after the score card, and if you follow too much after the score card it will cause harm.

Delegate—Don't you think that the Wyandottes are a better breed to get to a pound or a pound and a half the quickest?

Mr. Cottingham—We might run them more to a meat animal and sacrifice their egg production. From what experience I have had with them, they cut us all to pieces on the weight. If you can combine the two it is all right, but you might follow on some certain line and lose on the other. If you breed for weight too much, you will get away from egg production.

Delegate—My heaviest birds run more to the standard. I find that in getting weight they don't get length, but get heavy and blocky.

Delegate—I have learned by experience that pullets are not good sitters until they are two years old.

Delegate—I simply moved a Silver Wyandotte hen on her eggs from one part of town to another and she never left them. I had five cases of the same kind.

Delegate—Which of the Wyandottes do you think is the most profitable, the White or the Speckled?

Mr. Cottingham—The speckled ones, as you say, are the oldest breed and they have been bred for quite a while and people are enthusiastic about them, and then the white came out. I would not like to answer that question myself. My conclusion is that more people are handling the white than the solid colored varieties, and I think perhaps if they give them good care they would do as well. I think it is a matter of choice of the person as to what breed is the best for him. There is not much difference in size. We might breed a strain that is larger than others. The selection and shape in your breed, as you know, runs down to get more of the Leghorn type. I think if you will look up the history of the White Wyandotte you will find that it is not made up of one or two different breeds, but that it is a sort of the Silver Wyandottes. They are the same in shape as all of the Wyandotte family. It is all a matter of color.

Delegate—Isn't it a fact that for the average farmer a colored bird is better than a white bird?

Mr. Cottingham—I have some good friends who think a white bird is the best, and I like to see them on the farm. They look nice. There are a few people that say the white breeds are more molested with hawks.

Delegate—Is it best to keep one or two different breeds?

Mr. Cottingham—I think the only way for the farmer is to keep one breed.

Delegate—A lady said she had twenty-seven hens or pullets that set for a few days and then left their nests.

Mr. Cottingham—I would not set pullets at all. We do not want to depend on pullets.

Delegate—How long is a hen profitable?

Mr. Cottingham—I cannot tell you as to that.

Delegate—Isn't it the case that when a hen is three years old she is not profitable?

Mr. Cottingham—There is a hen on my place that is eight or nine years old. They are using some old hens. For the average farmer, I think perhaps two years.

Delegates—If you keep Plymouth Rocks until they are three years old they get too fat.

Delegate—Are the Black Langshans better winter layers than the Plymouth Rocks or Wyandottes?

Answer—I don't think so, for my part.

Mr. Heyl—They are better winter layers.

Mr. Cottingham—I never do get very many eggs in the winter, because they are worth more to me in the spring and summer when we are shipping eggs. After we married, my father lived on the same place and during the winter when I was getting no eggs, he had the same strain of Plymouth Rocks that I did, he gave them lots of attention and feed and he got eggs right along, just as many others did. For my part, I have little use for the Langshan, because it does not sell well in the market. This year at Eden they paid a cent and a half less for Langshans than other breeds. Mr. Clark always told me that the Langshans were the hardest breed to ship to eastern markets.

Delegate—What do they object to?

Mr. Cottingham—Object to the white skin, and black feathers and white skin look bad together. If you have a private trade, it will be all right. The packers object to them. They do not pack very many that come off the farm.

Delegate—What is your opinion of the Brown Leghorn?

Mr. Cottingham—The Brown Leghorns are the standard for layers, with the right kind of care. They have to have a little better house for protection of their combs, but they are good layers at any time. But with the pullets, you never have any trouble with them sitting, and it is my opinion that you get more eggs from them than you do from the Plymouth Rocks, because they do not set at all. I have an idea in my head that if I was raising for the market I would not want to sell in the general market, but I would want to sell to some hotel. I started one man, who furnished the National Hotel in this city with eggs; and I tell you the boarding clubs in Chicago at the university, where they want to buy eggs in case lots—I know if I had a trade like that I would take the Black Minorca, because I believe you can handle them to get more eggs than from the Leghorns, and the eggs are larger and nice and white and I think would command a premium over the eggs you would get from the Leghorns.

Mr. Farr—I thought that the fine egg trade called for a colored egg?

Mr. Cottingham—There are some markets in the east that command a brown egg and others that want a white egg. Our trade here don't care for color, but buy all equal. There is no one that likes a good egg better than I do, but I hardly ever eat them at the hotels.

Delegate—I would like to ask a question in regard to the different breeds; if there are certain breeds that stand the cold weather and lay better than other breeds?

Mr. Cottingham—Yes. The Mediterraneans came from the south part of Europe, where the climate is warm. The Asiatic breeds came from a cold climate and they have been bred for generations and they carry more feathers. The cold, freezing weather attacks the Minorca or Leghorn because he has a very large comb, while the Asiatics have small combs and the American breeds have small combs. You have to give the Mediterraneans better care than you do the American or Asiatic breeds.

Prof. Farr—I do want to say just a word or two before I go. Honestly, do you know what I see in this chicken business? To start out I will tell you that today I do not own a single, solitary hen, but I have owned a lot of them and good ones—Brown Leghorns, Plymouth Rocks and Brahmas, and I have tied up to the Rocks and have kept them for eight or ten years.

My thought is not the subject under discussion, but it is that there is a great opportunity in this matter of poultry culture. I am not a farmer, but from the school teacher's standpoint I believe that a county superintendent of schools, through the country teachers of his county, could distribute literature from the different agricultural stations, like Storrs, Connecticut, and Utah and the United States Station. I believe that we could talk chicken that would count for character and for better boys as probably no other thing for better use would be.

Now, I will tell you about that boy. He is at a pretty good business when he is reading about chickens. I have two boys, and they keep me guessing, just as your boys keep you guessing. After supper is over and I see them get down their poultry journals and score cards—and they have every poultry journal published—when I see them get down their poultry journals, I can go off to bed and feel safe. It is a good business for them and it is good reading for them. Let us have them read something worth while. I tell you the school teachers of the State of Illinois are short in not improving the conditions on the farm by doing more to make better boys, instead of the bridle and saddle boy. You all know who he is. He is the boy who goes to the stable after supper and gets his horse and visits around the neighborhood. But the seed corn boy, or the hog boy, or the Durham boy gets down his literature after supper and reads and at 10:00 o'clock he goes to bed a better boy.

Delegate—I think we would like to hear from Mr. Heyl.

Mr. Heyl—We have with us, perhaps, one of the oldest members of the American Poultry Association, Mrs. Judy. I would rather have you ask her questions, because she has had longer experience than I have and I believe she will do this subject more justice than I can.

Mrs. Judy—The score card is of much importance to learn how to mate your birds for egg production or meat production or for the show room. You need the score card and the standard tells you what shape you want for the laying breeds. Don't it help you to be a comparison judge? You must learn to judge by the score card when you get the shape of the back and when you get the shape of the body and all that. The score card divides the bird all into sections, and each section is cut so much, and when you are selecting your birds year after year you will get better egg production. I had a Light Brahma hen bred by Mr. Felch and she scored 95 points. I sent her a hundred miles away to my brother, and that hen laid eight eggs and every pullet from her was a good scorer, and during all of that time I never go out of that strain. You get a trap nest, and if she lays two eggs a year, each is worth $10.00 a piece, and I believe in keeping the old hen. I can't remember a high scoring hen that I ever owned that was not an egg producer, because I don't believe you can breed them close to the standard without increasing the egg production. Old Main Spring, you will find, was the great great grandsire of the bird that won the medal this year in Decatur. I believe in the score card. You can never learn to judge by comparison until you learn the defects in each section. Then if you was selecting for our school teacher a mate for that hen he has, where would you go? You would not go to a family of Rocks you do not know, but you would want to know if it is a family of egg producers. And that is what you select, not only the prettiest birds, but for egg production. If you want to raise eggs for market, go to Chicago or Decatur or any of the large towns, and let the eggs bear your name, and that puts on them a guarantee. Let one use them anywhere and they are good. I don't feel able to talk to you on this subject, but I must say a word about what I think about the Langshan. I have raised forty-two different varieties and studied them the same as I did the second part of Ray's arithmetic. I have worked with all of them—first with the Light Brahma, because I loved it and admired it and for a long time there was nothing for me but the beautiful Light Brahma. A neighbor wanted me to take some Plymouth Rocks. I carried eleven Plymouth Rocks in a sack in the dark. I had their nests prepared and I had eggs that I had selected out of the incubator that had been tested and found unfertile and would never spoil, and I covered them up and after night I would go to them and talk to them and say, "I want you to set and hatch these eggs and they will all be thoroughbreds." And the next day I would go to her a little, and I don't believe in one thousand I ever had three that refused to work for me. The pullet that will take to the nest on a warm day, don't put the eggs under until she is setting; and after she takes the nest firmly she will set on dishes, and you can't break her up. I would like to have Mr. Heyl talk. A great many people believe that the Mediterraneans are the breeds to produce eggs. If you feed your birds right, they are all good egg producers.

Mr. Burrows—I would like to say that if I am a member of the board of directors another year we will have a poultry section and have a good man to speak to you, if I have to go after him myself. I do not know Mr. Miller Purvis, or why he is not here, but we owe you an apology.

Mrs. Judy—I would like to say another word about Langshans. I have dressed Langshans, and you can dress the Langshan as prettily as you can any breed. They are good egg producers and good mothers and don't object to the color of the skin. You find that in the Black Minorcas, Black Cochins and other black breeds.

Mr. Cottingham—It was all black breeds. For Langshans and all black breeds they paid a cent and a half less.

Mr. Heyl—I think this crowd has about all the poultry talk they care to hear. I am sure that you missed a great treat in not hearing Mr. Miller Purvis, as he is the greatest authority we have on poultry. I don't know why he is not here, and I think it is an injustice to have you sit here and listen to me. I am not a speaker. I have a knowledge of breeding poultry and judge them, but I am not used to getting up and telling about them.

It is the greatest industry of all on the farm and the most profitable for the care and feed of any other kind of live stock. I care not what you breed, the Percheron horse or dairy cattle, there is more profit in the old hen.

Perhaps you will be interested to know that the revenue from the old hen amounts to more than all the corn and wheat produced in the United States.

The old hen is more neglected than any other live stock raised on the farm, and it usually falls to the lot of our better half to look after the hens, and when they get their combs frosted and we wonder why we are not getting any eggs—and a good many husbands find fault because they are not getting any eggs, but they have never provided a shelter for the fowls. I know a man that does not cover a territory of over three towns who has bought over $100,000.00 worth of eggs and poultry. When I say that they are the most neglected of any live stock on the farm, it is true. I am certain that I am right when I say that not over 10 per cent of the farmers in Tazewell and Peoria counties use pure bred cockerels. They should, as they are the most profitable live stock we have on the farm. I want to drop a hint right here. We are having a little financial crisis. We do not know where it is going to end, but if it continues like it did in 1891, 1892 and 1893 the old hen will continue to be profitable, and you will receive more for the labor involved than any live stock on the farm. When horses are selling for $280.00, just grades, you forget about the hen. But you will call her to mind when you get down to where we were in 1892 and 1893. We have always said they eat their heads off, but the old hen brings in more money than any thing on the place. There has not been one day in two years in my business—I am breeding pure bred stock—there is not a day, not a month that there is not an income. I am booking orders for eggs now and will send them out until time to send out show stock, and then again begins the season for eggs. So, if a breeder for utility breeds in the spring and breeds Asiatics they will lay in the winter. Take the Cochins and Brahmas, they lay for you when eggs are high and lay for the entire summer, and before eggs get down cheap you begin to put broilers on the market. So you are continually putting on the produce of the old hen during the entire year and it amounts to more than all the corn and wheat in the United States.

Now, if there are any questions in reference to poultry I shall be glad to answer them so far as I know, and if I don't know how I know Mr. Cottingham does.

Delegate—How about feeding them in winter time? Do you feed a mash feed for eggs or mostly grain?

Mr. Heyl—We feed a mash feed. I think there ought to be one mash feed in winter and that fed at noon. In the morning, if you scatter wheat or oats in the litter and make them work for it it keeps them in good health and exercise and then at noon give them a mash and at night as much corn as they will eat; I would warm up the whole corn.

Delegate—In the winter time when I feed my chickens we have a corn sheller and I shell as much as a peck or half a bushel and I take it in the house and put it in the stove and thoroughly warm it when it is zero weather. It is like ice, and if you put it in the stove and warm it so it does not burn them, it is good for them.

Mr. Heyl—You can't get eggs if they are cold day and night. My experience is that there is more eggs along with this feed in green cut bone along with any other feed that you can feed them. That will not suffice alone.

Delegate—Do you feed clover hay?

Mr. Heyl—I have fed clover hay. I feed that with my mash. I cut it. Last winter I fed it the entire winter. I would put it in a bucket of hot water and cover it over and let it steam and mix the other feed with it. It takes the place of green food in the summer time. I fed another feed. I raise it. I think it is the best feed raised. That is beets, mangel wurzels, I call it. I think I did not have over one quarter of an acre and I had twelve loads. Take them in the houses and have a cord tied from the roof and let it swing above the floor about a foot and you will be surprised at how much they will eat. They will eat the entire beet in a day.

Delegate—I would like to know the difference between cut clover and ground.

Mr. Heyl—It is simply protein roughage; whether it makes any difference whether it is cut or ground, I think not. If I had a way to grind it, I would. I think if it is ground they like it better.

Delegate—How many chickens do you think it profitable to begin with?

Mr. Heyl—That would depend wholly upon the room you have and the intention you have, whether breeding for utility or fancy.

Delegate—For utility and fancy?

Mr. Heyl—Would you have plenty of room, several acres, perhaps? If you have a lot 50 by 100 feet you would not want so many. Much depends on the run you have. If you breed one variety, I would not recommend over ten to fifteen and one cockerel in a yard. If you raise them on the farm or on three or four acres' run, you can just as well have fifty to one hundred hens to four or five cockerels.

Delegate—You can keep a dozen chickens at a profit?

Mr. Heyl—Yes, madam, indeed.

Delegate—How many square feet do you figure on for a chicken?

Mr. Heyl—Well, I don't know as I can answer that exactly. I can tell you how I raise them on my place. I have a house a hundred feet long divided into nine yards. I have runs to that house one hundred and twenty feet deep and from eighteen to twenty-four feet wide. I have extended the ends out. I don't keep more than eleven hens in one.

Delegate—How wide is that house?

Mr. Heyl—Twelve feet; but there is ten feet of that in the pen. There is a two foot aisle through the house. The pens are about 10x10, 10x11, and that is plenty large enough for the yards. During the winter I keep from twenty to twenty-five in one of those places. Then I have other yards that are still larger.

Mrs. Judy—Mr. Burrows has sent me a supply of ground and cut alfalfa and my experience is if you feed by the hopper system that I believe that the cut is the best.

Mr. Heyl—I have never had any experience with alfalfa. In feeding dry with ground clover we could feed it in the mash and cut clover could be fed in the hopper. It is all theory with me.

Mr. Cottingham—I have a patch of alfalfa. We mowed it four times and the last cutting we got cured very nicely. It is about as nice as I have seen in this country. I am cutting that up now and mixing it with bran and shorts and giving it to my brood sows, feeding it dry to them, but I think I am doing the right thing with the sows. We are feeding that now to the chickens, and we wet it up in the morning and feed it in the mash, about half alfalfa and half shorts and bran. We are cutting this now. I have fed some of the ground and have fed some of the afalfa meal from the west mixed with molasses, and they do fine. They eat more of it than you would believe. I have had people laugh at me about feeding that.

Delegate—How fine do you cut it?

Mr. Cottingham—I think it is cut half an inch. They have a mill for cutting for poultry, but the mill I have is run by a gasoline engine and that also runs the washing machine. This mill cuts a quarter of an inch.

Mrs. Judy—Don't you believe that is a better length?

Mr. Cottingham—I believe the cut is better than the ground.

Mr. Heyl—You don't want it too fine. If it is cut a quarter of an inch I would prefer that to feed.

Delegate—Do you have any boards under your roosts?

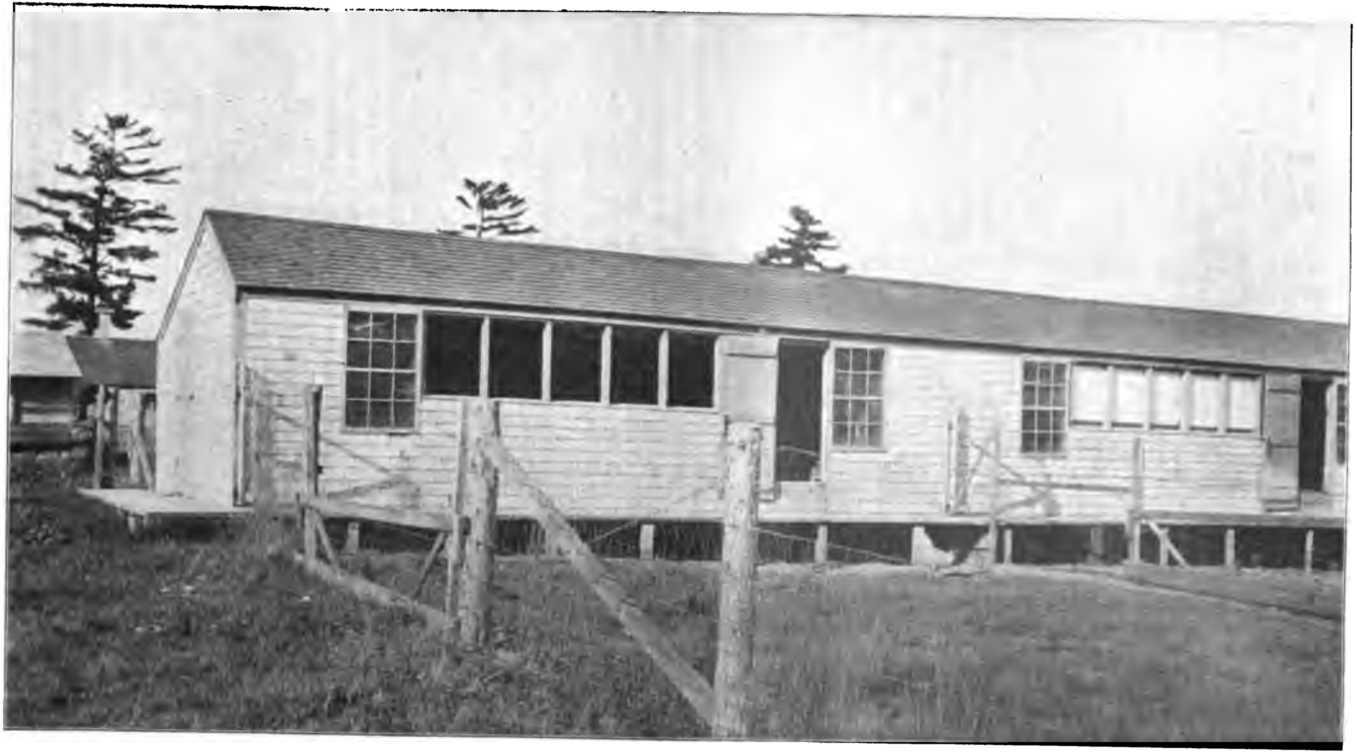
Mr. Heyl—Yes, sir; movable roosts in all the pens, and then they have the entire pen for a scratching pen. If I was to build any more yards I would build scratching pens with each yard. They would not have to have such a large place to sleep, as they would have this scratching yard to go into, where you would find them the largest part of the winter. They would not need as large quarters to roost and lay.

Delegate—Have you any way of heating your houses?

Mr. Heyl—No, madam, I do not advise artificial heat. I think it is injurious.

Delegate—You have the houses tight?

Answer—Yes, sir.



Muslin Window Poultry House.

Delegate—Do you use much glass in your houses?

Mr. Heyl—Yes, considerable. I have double windows. I would not advocate too much glass in your houses for the winter. If you have ventilation and light, that would be sufficient.

Delegate—Did you ever use muslin windows or curtains?

Mr. Heyl—I have never used them. I have seen them demonstrated at our last two shows. I think our friend Potter, at Downer's Grove, has a good system. I believe that it would keep out enough cold and you would get better ventilation.

Mrs. Judy—I have hen house that is warm and I have lost every comb, and this winter the windows were out and I tried to get them put in, but could not; and what I thought was a great misfortune has turned out to be one of the best things I ever had happen. I finally fixed up a canvas over there and my chickens have been comfortable and have been scratching in there like summer time, and I believe it is better not to shut them up. I believe you should protect them from dampness and keep them dry. And I believe that with a room as big as this, if it was covered with 8-cent muslin that it could be kept comfortable. I think it was a great fortune to me that I could not get the windows put in when I wanted them.

LETTER FROM C. E. BARKER,

Superintendent East Peoria Public Schools.

April 9, 1908.

MR. FRANK H. HALL, Aurora, Ill.,
Superintendent Farmers' Institutes,

DEAR SIR—My high school attended in a body the recent session of the Farmers' Institute in Peoria during the afternoon devoted to school interests, and all wrote reports on one or more of the addresses given at that time.

In compliance with your request I am sending you the report I consider the best.

Very truly yours,
C. E. BARKER.

*REPORT OF MRS. ROMINE'S ADDRESS, BY BERTHA LAPOINTE, A PUPIL IN THE EAST PEORIA HIGH SCHOOL.

EDUCATION OF THE GIRL.

The greatest mission of women here on earth is to make the world homelike. How shall women fulfill this position in life if she has not given the subject careful study and thought? In every girl there is that "something" in her heart that causes her to look forward to the time when she shall have a home of her own and matronly duties to perform.

If the life work of a woman is the making of a home, how should she be trained? Her education should not be the studies of sciences, languages and mathematics alone, but should include some study that would aid her in carrying out her life work. Nothing could be more beneficial to her than a course in domestic science.

Someone asks the question, "Of what value is the study of geometry to a student?" The answer is, "To develop his or her reasoning powers." Of course this science develops the mind along a certain line but it takes a combination of studies to develop the mind of a girl to enable her to solve the difficult problems of a house wife. There is nothing better to develop her powers of discrimination than sewing.

Some girls marry because they have the idea that after marriage they will not have to work. A girl under this impression will find that she has made a great mistake. For no matter how many hired helpers she may have, unless she is capable of doing everything that she requires them to do, she will never be a successful housekeeper. A home will soon become corrupt if the mistress does not tell her servants of their shortcomings.

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*Consult Index.

A certain lady that had a daughter taking a course in cooking said that she did not like it because she could not keep her daughter out of the kitchen. If the kitchen is not the proper place for a girl or woman, whose place is it? Surely not a man's.

The girl who says she does not care for housework and does not think that domestic science is interesting, is certainly an exception to the rule, for nature says that every girl shall fulfill her mission in the world. No matter what the prospective life work of a girl may be, she will find that her knowledge of things pertaining to domestic science will be invaluable.

BERTHA LAPOINTE,
East Peoria High School, East Peoria, Ill.

Letter from W. R. Lackland, Jr., a pupil in the Morton Township High School, Morton, Ill.

April 8, 1908.

SUPERINTENDENT FRANK H. HALL,
Aurora, Ill.

DEAR SIR—In accordance with your request that Morton Township High School be present at the lecture given by Dr. Cyril G. Hopkins at the Illinois Farmers Institute in Peoria, I attended and took notes on his address. You will find either in this mail, or the next, a copy of what I gleaned from his lecture. Our school had the largest representation of any present. I have never taken chemistry, but I tried as far as possible to give the lecture in the thought and style of Dr. Hopkins. If you think there are any things in it that it would be better to leave out, please do so. I should like to hear from you as to whether this is satisfactory.

Yours very truly,
W. R. LACKLAND, JR.

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*REPORT OF DR. HOPKINS' ADDRESS, BY W. R. LACKLAND, JR., A PUPIL IN THE MORTON TOWNSHIP HIGH SCHOOL.

We know that everything is simple if we begin at the bottom. Consequently it is essential this afternoon that we begin wholly at the bottom of this subject if we are to understand it thoroughly. Now, we must first of all start with materials. What is it that will make a two hundred pound heifer weigh fourteen hundred pounds? The answer is, material; and this must be of such a nature as will be capable of producing flesh. You see we must have material in order to accomplish our object. Now, just as it requires material to fatten the heifers it also requires material to make corn.

The food upon which corn will thrive is divided into ten different kinds, viz: Carbon, oxygen, hydrogen, nitrogen, potassium, phosphorus, magnesium, calcium, iron, and sulfur. All these exist in different proportions in different soils. We must have all of them. Not one can be absent, for in such a case the corn could not grow. These ten kinds of plant food are known as the plant-food elements.

In order to get at the bottom of the subject, we must first know what an element is. Let us take an ear of corn for example. The first change that takes place is the taking of the kernels from the cob. Then we can commence subdividing the grain, as into starch, oil or fat, bran, fiber and sugar.

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*Consult index.

Here are the main subdivisions of the grain of corn:

Corn
- 1. Carbohydrates.
  - 1. Starch.
  - 2. Sugar.
    - 1. Carbon.
    - 2. Hydrogen.
    - 3. Oxygen.
  - 3. Cellulose.
- 2. Fats.
- 3. Protein.
- 4. Ashes.

When we come to each of the last divisions, we have an element, as carbon, for instance. Carbon is carbon. We can make no more subdivisions for we are at the bottom. The carbon is truly a chemical element.

Of the ten elements that I have named, the four most abundant are calcium, magnesium, sulfur and iron. There is enough iron in the first seven inches of soil to raise one hundred bushels of corn per acre for two hundred forty thousand years.

Have you noticed that the farmers are beginning to talk about things of which they knew nothing ten years ago? They are speaking of the elements of the soil. In this particular subject we must use technical terms. Some farmer might say: "Well, I don't understand these terms. Can't you speak of these things in terms with which I am acquainted?" No, friends, these technical terms are the names of the elements of the soil. Every vocation has technical terms which are peculiar to itself. You must learn to use them. Suppose a man were working on the railroad and some official should tell him to do some certain thing and in the order use a technical term. The man says he does not understand and he does not care to use these terms. You can readily see that he would not hold his job very long. So you see that nitrogen is nitrogen. We cannot give it any other name unless we go into some foreign language.

Now, as I said before, carbon is an element. We can obtain carbon by driving out the hydrogen and oxygen from any organic matter. If we unite two elements we have a compound. In this bottle I have carbon and in this one I have sulfur. By uniting two parts of sulfur with one of carbon we have a compound known as carbon bisulfid. Compounds vary in containing two to three or more elements. These may be in several different forms, as solids, gases, or liquids. By increasing the temperature a solid may be changed to a liquid and from a liquid to a gas. By again reducing the temperature, a gas may be reduced to a liquid and then again to a solid. Into this test-tube I pour mercury. Now, in this I place an iron bar. As the iron is lighter than the mercury, the bar floats like a cork floats on water. In this bottle I have the two elements as a compound known as mercury oxide.

Suppose I go to the furnace and put in one hundred pounds of coal, open the draft and leave. When I return I find instead of one hundred pounds of coal, ten pounds of ashes. Ninety pounds have passed into the air as carbon-dioxid. Thus the compound has been broken up. Let us look for a moment at another. Water is a true compound formed of the two elements, hydrogen and oxygen. When the two become separated they are gases. Let us see what the hydrogen will do. I have in this bottle some zinc filings into which I pour some sulphuric acid. We can notice a smoky substance in the bottle when it is shaken. Since hydrogen is lighter than air, it will rise. We may collect some of it by placing this test-tube bottom side up over the glass tube which leads from the bottle. When some has been collected I take off the tube and apply a match to it. The hydrogen explodes. By lighting a match and touching the tube which arises from the bottle, a tiny flame appears. This consumes the hydrogen as fast as it is formed.

Silver-nitrate is formed by dissolving silver in nitric acid.

Let us see if we cannot obtain some carbon. Sugar is composed of carbon, hydrogen and oxygen. If we can get rid of the hydrogen and oxygen, we will have carbon. Into this glass I put some sugar and slightly moisten it with water. Now, by pouring in some sulphuric acid I will drive out the two undesired elements. When the mixture is stirred the whole is changed to a black liquid. After letting it stand for some little time, we take out the mass in the glass and find it to be carbon.

Nitrogen is found all through the air and exists in the proportion of about twelve pounds to each square inch of the earth's surface. I cannot show any of it to you in its natural state, but when it exists in the form of a compound it can be shown. In this jar are nitrogen, hydrogen and oxygen, which together form ammonium-nitrate. About thirty-five per cent of this is nitrogen. Now, nitrogen is absolutely essential in the growth of corn. A small amount is found around the roots in the ground, but a far greater amount surrounds the blade and the stalk. Corn has no power of using the nitrogen that is in the air. The clover and other legumes are the only plants which are capable of taking the nitrogen and this is done by means of bacteria on the roots. To use this element that is in the air for the growth of corn and other crops, is a problem which chemists have tried hard to solve. So far but two ways are known whereby it can be taken from the air. First, by a direct electrolytic process, and secondly by the bacteria on leguminous plants.

Sodium-nitrate is a very good fertilizer, but it hardly pays to use it for corn. Nitrogen in sodium-nitrate costs about fifteen cents a pound. To a gardener this would be all right, for he can raise a much more valuable crop, which amply pays for its cost.

Phosphorus, another element of the soil, exists in only small quantities. The element itself is used principally in making matches. The phosphates, of which calcium-phosphate is the principal one, are all good fertilizers. In calcium-phosphate, 20 per cent is phosphorus and the compound is formed by the union of lime and phosphorus. The peculiarity of the latter is that in its pure state it must be kept in water, for as soon as it comes in contact with the air, it ignites and burns. The farmers want this element, but not in its pure state. When it is united with water as a compound, it forms phosphoric acid. In this bottle is a pure piece of phosphorus. If I cut off a piece and place it on this plate where it is exposed to the air it burns and leaves a deposit of alkali.

Now, alkali is just opposite to an acid. Let me play the part of a magician for a moment, at least to explain a trick, which might seem quite marvelous to one not acquainted with it. I have here six glass tumblers. In every other one I will put a little sulphuric acid and let it stand until dry. I now place the tumblers in a row, first a plain one, then one which contains sulphuric acid then a plain one, and so on with the others. Then I place a little of the alkali, which was on the plate previously mentioned, in the water in the pitcher. I now pour some of the contents of the pitcher in the first glass and there is a glass full of water. I do likewise with the second glass, but instead of water there is wine. I continue thus until there are three glasses of water and three of wine. The alkali and the acid have changed the water to a red color. Now, if there is sufficient alkali in the pitcher to overcome the acid in the glasses, I may pour the contents of the latter into the pitcher and all will again be clear.

Potassium is also a very peculiar element. It is a metal which is soft and can easily be cut with a knife. I will cut off a small piece. Now, note what happens when I drop it into a glass of water. It immediately burns in a deep red flame and changes the water to a carmine color. If a farmer would chance to take a load of potassium home in a wagon and would be caught in the rain, the farmer, wagon and all would probably burn up.

Thus we see some very peculiar things in our study of agricultural chemistry, and things which the farmer should endeavor to become acquainted with. It is only by his knowledge of the elements which make up the soil, that he can work for better soil fertility.

*REPORT OF DR. HOPKINS' ADDRESS, BY HANNA M. KUPEL, FRESHMAN IN THE KINGMAN HIGH SCHOOL, PEORIA, ILL., MISS M. E. HEIRICK, PRINCIPAL.

It is easy to understand the construction of anything if we begin at the bottom; and the bottom rests with the materials which enter into the composition of it. Until comparatively recent years farmers gave very little attention to the question of what enters into the composition of plants or crops.

Stock feeders knew what materials were necessary for the raising of stock, but they never thought of what materials entered into corn, hay and other grain. Ten kinds of plant food are needed for the making of corn, and should one be omitted corn cannot be grown.

These foods are present in large or small quantities, but whether in large or small quantities, each food is required. These foods are called elements of fertility.

Let us take an ear of corn and separate it into its parts. First, we have the cob and the shelled grain. Next, dividing a grain of corn into its parts, we find starch, sugar, fat or oil, bran or fiber and mineral matter. But these are not yet elements. Let us again examine one of these—sugar, for example, and here we find carbon, hydrogen and oxygen.

But here carbon equals carbon and hydrogen equals hydrogen; at last we have come to real elements.

A thing indivisible is a chemical element.

Water is composed of two elements, two atoms of hydrogen and one atom of oxygen. Some other elements are: Calcium, iron, sulphur and magnesium. They are found in all crops.

Allowing 100 bushels of corn to an acre, enough iron may be found in seven inches of soil to raise that amount of grain for 2,000 years, providing the soil contains the other plant foods necessary to the construction of corn.

It might be well to say something here about technical terms. Technical terms are said to apply to some man's business, about which we know nothing. We should learn something about the other man's business and make the supposedly technical terms no longer so. The terms are not technical to the man who is engaged in that particular business.

A man desired to work on the railroad as brakeman. He went to the foreman, who took him to the railroad yards and commenced talking about and explaining the uses of the automatic coupling. To the foreman's amazement, the man asked him not to use technical terms. Now, how could that man, if he wished to be a brakeman, substitute another term for automatic coupling?

Let us take up the farmer question. The farmers are just as intelligent as any one else, though some city people think the farmers are dull and ignorant because they live in the country. But the farmer needs education and gets it if he cares to have it. He is learning to call nitrogen nitrogen —perhaps "strick stoff," if he is German.

Organic matter is made up of chemical elements. Some elements are solid, some are liquid and some are gaseous. By changing to a high or low temperature the elements may be changed—the solid to liquid and then to gaseous; the liquid to solid or gaseous, and the gaseous to liquid or to solid.

Liquified air boils on ice, consequently it must be liquified at an extremely low temperature and a still lower temperature will be required to change it to a solid form.

Now, let us take some elements and make compounds. Several elements combined make an entirely different subject called a compound. For example, the two solid elements, carbon and sulphur, united in the proportion of one atom of carbon and two atoms of sulphur, make a limpid liquid called carbon bisulfid.

Another element is mercury, commonly called quicksilver. It is a very heavy liquid, so very heavy that iron floats in it like a cork on water. Let us take some mercury and mix it with air; it makes a yellow substance called mercury dioxid.

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*Consult index.

Now, let us take a hundred pounds of coal, 90 per cent of which is carbon. Let us put the hundred pounds of coal into the furnace and open the vent, allowing the oxygen to enter, in a short time nothing but ten pounds of ashes are left. When the oxygen entered the furnace the carbon united with the oxygen, forming a compound called carbon dioxid.

Another compound is water; it is composed of two elements, both of which are gases. They are hydrogen and oxygen. Two atoms of the first and one atom of the second being required to produce one molecule of water.

We will take a little sugar, and to hasten the process we will moisten it with a little water. We already know that sugar is made of carbon, hydrogen and oxygen. Placing sulfuric acid into the sugar, the water is absorbed by the acid, and the remainder is pure carbon—a black substance.

Nitrogen, a colorless gas, is found in the air, in the proportion of twelve pounds to the square inch of the earth's surface.

A compound of hydrogen, oxygen and nitrogen makes a substance called ammoniun nitrate; thirty-five per cent of this is nitrogen.

It has been the dream of chemists to be able to take nitrogen from the air, and change it into some form that may be absorbed by the corn plant, for of all the grains, only the clover and alfalfa plants and other legumes have power to absorb the nitrogen in its natural form. This power is due to the bacteria which are found on the roots of these plants.

Dealers in fertilizers import shiploads of sodium nitrate from Chile, and some farmers use dried blood and cotton seed meal for the same purpose.

After working almost incessantly for many years, chemists have at last found two processes by which nitrogen may be taken from the air. First, by an electrical process forming nitric acid and with lime making a compound called calcium nitrate. Second, by using a compound called calcium carbid, a substance used in bicycle and automobile lamps, and from which, if water comes in contact with it, acetylene gas is produced.

At a high temperature calcium carbid will combine with nitrogen, to form a compound called calcium cyanamid. Thirty-five per cent of ammonium nitrate is nitrogen, it is therefore a good fertilizer, although it is not yet on the market in large quantities; and since the nitrogen in this costs fifteen cents a pound it cannot be used economically. It would therefore not pay to buy it for a large tract of land, but for a small truck farm great results would probably be obtained.

Phosphorus is another interesting element. Thirteen pounds of this element are found in 100 pounds of rock phosphate. There are 250 of phosphorus in one ton of steamed-bone meal.

"A-t-e" on the end of a true chemical name means oxygen; that is, it means that oxygen is in the compound.

One atom of copper, one of sulfur and four atoms of oxygen make a compound called copper sulphate. Some people call it "blue stone," but the name copper sulphate means more than the name "blue stone."

Pure phosphorus is very curious. If it comes in contact with the air it will begin to smoke, and finally will burn. Consequently, phosphorus must be kept under water. If phosphorus does burn, it becomes soft and sticky like molasses, and makes serious burns.

Phosphoric oxid contains forty-three and two-thirds per cent of phosphorus. When phosphoric acid enters the soil it makes a compound called calcium phosphate, but the soil can keep none of the free acid.

Phosphoric acid has power to change a solution of phenol phthalein to a red color and an alkali is necessary to restore it to its original color. Magicians sometimes use this method for changing water to wine and wine to water.

Place potassium in water and half the hydrogen and all the oxygen will pass off leaving one part of the hydrogen to unite with the potassium, forming a compound called potassium hydrate.

Potassium sulphid is greenish yellow and contains 70 per cent of potassium. Potassium chloride contains 40 per cent of potassium. Thirteen carloads of this were used on some marshy fields up north, to supply potassium to partly swamped lands and the result was a success.

MINUTES OF THE MEETINGS

OF THE

Board of Directors and Various Committees

OF THE

ILLINOIS FARMERS' INSTITUTE

For the Fiscal Year Ending June 30, 1908.

MINUTES OF THE MEETING OF THE EXECUTIVE COMMITTEE OF THE ILLINOIS FARMERS INSTITUTE, HELD IN THE OFFICE OF THE SUPERINTENDENT OF COOK COUNTY SCHOOLS, ROOM 546 COURT HOUSE, CHICAGO, SEPT. 21, 1907.

Those present were: Directors, Charles W. Farr, C. P. Reynolds, H. G. Easterly, B. F. Wyman and A. P. Grout. Superintendent Hall and the secretary were in attendance.

Vice President Charles W. Farr presided.

Superintendent Hall stated the object of the meeting and read the following letter from President Schermerhorn, and on motion the same was made a part of the records:

SPOKANE, WASH., Aug. 20, 1907.

To the Board of Directors of the Illinois Farmers' Institute, Springfield, Ill.:

GENTLEMEN—When I accepted the honor you so unanimously conferred upon me last March, I could not foresee that my private business would make it impossible for me to serve the institute in Illinois, giving it the time and thought it so much deserves. My business interests in the west have so developed as to require my personal and constant attention, and I have disposed of a large part of my business in Illinois and have removed with my family to Spokane, Wash., there to reside indefinitely. It is on this account, but with sincere regret, that I must sever my very interesting and pleasant relations with the Illinois Farmers' Institute, both as director of the Twenty-third Congressional district and as president of the board of directors. I, therefore, present to you this, my resignation from both above mentioned positions, respectfully asking that the same may take effect September 1, 1907.

I wish to thank the members of the board for their uniform kindness, their hearty support, splendid friendship and unswerving loyalty throughout my administration. It has been a pleasure to serve you in the position of president, and though my district was large and some of the counties have failed to come up to the standard in institute work, I believe the work has made significant progress. In resigning the directorship of the Twenty-third district, I cannot refrain from expressing the wish that you may see fit to appoint as my successor, to fill out the unexpired term, Mr. William Leckrone of Salem, Marion county, who, I believe, will carry on the work successfully.

Assuring you of my sincere regret in leaving the work in Illinois; that I will always be interested in its welfare and wish for the board and its officers abundant success, I am Very truly yours,

A. V. SCHERMERHORN.

Director Reynolds offered the following resolution and moved its adoption:

WHEREAS, President Schermerhorn has, with his family, removed from the State of Illinois to the State of Washington, there to reside indefinitely, and has tendered to the Board of Directors of the Illinois Farmers' Institute his resignation as President of the Board and as director of the 23d congressional district, be it

Resolved, That in accordance with Mr. Schemerhorn's wishes and that there may be no halt in the progress of the institute work of the State, the resignation of Mr. Schermerhorn is hereby accepted, and be it further

Resolved, That in accepting the resignation we desire to express our sincere appreciation of his earnest, energetic and valuable services in the various positions he has held in the institute work of Illinois; that we regret very much the fact that his personal business interests in the west would not permit him to continue in the work in Illinois, and that we are deprived of his counsel, assistance and congenial association.

Unanimously adopted.

On motion, Mr. Will M. Leckrone, of Salem, Marion county, was elected to serve as director of the 23rd Congressional district until the next regular election.

The matter of the vacancy in the directroship of the 19th Congressional district caused by the death of Director E. E. Chester, was reported and the following resolution was adopted:

WHEREAS, Our esteemed co-worker and friend, Mr. E. E. Chester, Director of the 19th district, ceased his earthly labors at his home in Champaign, Ill., on Monday, September 2, 1907, be it

Resolved, That in the death of Mr. Chester, the Board of Directors of the Illinois Farmers' Institute has lost a valuable member, and progressive agriculture in Illinois an intelligent, earnest, active friend; that his long, intelligent and valuable services as director of the 19th district, as member of the State Board of Agriculture, member of the Board of World's Columbian Exposition directors, as president of the Illinois Corn Growers' Association, as judge in awarding premiums at the World's Fair at St. Louis, Mo., and as member of the first Board of Directors of the Illinois Experiment Station, has erected to his memory a monument more valuable and lasting than anything we may here express, and be it further

Resolved, That we extend our sincere sympathy to the bereaved family, and to all who knew him in his varied activities, for to have known him personally is to feel deeply his loss.

On motion of Mr. Reynolds, Mr. J. B. Burrows, of Decatur, Macon county, was unanimously elected to serve as director of the 19th district until the next regular election in that district.

The secretary was directed to notify the county institute officers of the 19th and 23rd districts of the election of directors to fill existing vacancies.

The matter of arranging the program for the Thirteenth Annual Institute meeting to be held at Peoria, February 11, 12, 13, 1908 was discussed at length and the superintendent was instructed to correspond with a number of prospective speakers and to report progress at the next meeting of the committee.

On motion the committee adjourned to meet at the call of President Charles W. Farr.

Approved by the board Feb. 25, 1908.

ILLINOIS FARMERS' INSTITUTE,
OFFICE OF THE SECRETARY,
SPRINGFIELD, ILL.

REPORT OF CONFERENCE HELD AT NATIONAL HOTEL, PEORIA, NOV. 20, 1907.

Pursuant to the call of Superintendent Hall, which was issued in accordance with instructions given by the board of directors at their meeting in Peoria, June 27, 1907, a conference was held in the parlors of the National Hotel, Peoria, Nov. 20, and those present representing their respective counties were:

Bureau county—F. C. Jacoby and C. C. Pervier.
Cook county—Chas W. Farr and H. H. Gross.
DeKalb county—B. F. Wyman.
Fulton county—R. H. Quick and E. H. Diehl.
Henry county—R. C. Hanlon and W. G. White.
Jackson county—H. G. Easterly.
Kane county—Frank H. Hall.
Knox county—J. W. Head and T. H. Castle.
Logan county—H. E. Starkey and W. J. Huston.
McLean county—S. B. Mason, C. L. Mays and S. W. Snavely.
Marion county—A. V. Schermerhorn.
Mason county—J. G. Spaits, Chas. E. Himmel and G. H. Wiemer.
Marshal county—J. A. Shanklin and R. R. Newburn.
Putnam county—E. O. Gunn.
Scott county—A. P. Grout.
Sangamon county—H. A. McKeene.
Stark county—J. H. White.
Tazewell county—Ralph Allen, J. L. Schwarzentraub, Peter Sweitzer.
Woodford county—Howard Leonard, S. M. Snyder and R. J. Dickinson.
Whiteside county—A. N. Abbott.

On motion, Mr. Charles W. Farr, of Cook county, was elected chairman of the conference and H. A. McKeene was selected for secretary.

Superintendent Hall was asked to state the object of the meeting. Superintendent Hall said that the meeting had been called for the purpose of devising ways and means for creating an interest in, and for increasing the attendance at the State meeting to be held in Peoria, Illinois, Feb. 11, 12 and 13, 1908. Mr. Hall made several suggestions and called on Mr. Ralph Allen, director of the 16th district for further suggestions.

Mr. Allen responded, explaining his views at length in a very interesting and comprehensive manner, making a number of valuable suggestions. Mr. Allen plead for a business system of advertising, and for the coöperation of the delegates present. He asked that the delegates coöperate with the executive committee and the officers of the institute in disseminating information in reference to the State meeting and to receive and post advertising matter furnished, and that they interest themselves in securing large delegations from their respective counties to attend the meeting.

Messrs. Gross, Grout, Mays, White, Hanlon, Leonard, Head, Castle, Schermerhorn, Starkey, Wyman, Abbott, Easterly, Pervier, Farr and others addressed the conference, asking and answering questions and making suggestions.

Mr. O'Connor, mayor of Peoria, Mr. Cole, editor of the Saturday Review, Mr. Baldwin, editor of the Peoria Star, and Mr. Dick Townsend, member of the Peoria Promotion Club, were also present and addressed the conference. These gentlemen assured the delegates that everything possible would be done by the Promotion Club, the newspapers and the city of Peoria to make the meeting a great success so far as attendance was concerned, as well as providing suitable halls and other necessary conveniences.

After luncheon, Superintendent Hall moved that the delegates present as soon as practicable, furnish to the secretary a list of several hundred farmers of their respective counties, together with their post office addresses for the use of the executive committee in mailing advertising matter.

Motion unanimously adopted.

After a short but pointed address by Chairman Farr, Mr. Allen moved that the executive committee be requested to get out attractive posters setting forth the important points of the program, and that each delegate present resolve himself into a committee of one to receive this advertising matter and post it in his county, as well as to do all in his power to secure large numbers to attend the State meeting.

Unanimoulsy adopted.

At the close of an interesting and instructive discussion relative to ways and means of securing attendance at county institute meetings, methods of advertising and making up programs, etc., the conference adjourned.

After the adjournment of the conference, the executive committee met with President Farr in the chair. Those present were: President Farr; Directors Easterly, Grout, Wyman, and Directors Allen, Abbott and S. B. Mason were invited to be present. The superintendent, the secretary and ex-President Schermerhorn were also present and Mr. A. J. Bill came in later.

Superintendent Hall reported progress in arranging the program for the State meeting; he also reported some disappointments in being unable to secure some of the material that had been suggested by the committee at a former meeting.

Several hours were consumed in discussing and arranging a tentative program, getting it in shape for approval by the committee, and everything that could be settled by the committee at this time was arranged and approved. It was decided to have some sectional meetings for the discussion of such special subjects as a large number of the farmers are interested in; to have one afternoon and evening devoted to the interests of the young people; this meeting to be addressed by the strongest talent that can be secured, and high school pupils are to be invited to be present with their teachers and with tablet and pencil for the purpose of making notes to take home with them. The teachers will be requested to follow up some of the suggestions made at these meetings.

After doing all that could be done at this time, in reference to perfecting the program, the president, superintendent and secretary were instructed to complete the program and arrangements for the meeting and to use such funds as they deem proper in the advertisement of the meeting.

On proper motion, the executive committee endorsed the suggestions of the conference just held and instructed the officers to coöperate in every possible way with the delegates of the conference for the promotion of the meeting.

The secretary reported as follows:

SECRETARY'S REPORT.

FINANCES.

To the Executive Committee:

GENTLEMEN—The balance to the credit of the several funds, including this date are as follows:

Fund No. 1, Office expenses	$2,402 28
Fund No. 3, Libraries	789 96
Fund No. 4, General expenses	3,388 44
Fund No. 7, Domestic Science	401 46
Total balance	$7,982 14

Available for office and general expenses:

Fund No. 1	$2,402 28
Fund No. 4	4,384 44
Total	$6,786 72

After deducting from this amount $2,700.00, the amount estimated for salaries and press bureau work, we have a balance to the credit of two funds (1 and 4) of $4,086.72 which will be available for holding the State meeting and general institute work.

Our balance on the corresponding date last year was $426.07 less.

SCHOLARSHIP RECOMMENDATIONS.

We have recommended 120 young men for scholarships in the College of Agriculture, and 96 of them are in actual attendance. Twenty-four have not availed themselves of the opportunity.

LIBRARIES.

Since our last report, 16 libraries have been returned to the office, and 39 have been sent out to applicants.

THE PRESS BUREAU.

We are indebted to Mr. A. J. Bill for a report in the Press Bureau work from its beginning to Nov. 15, 1907. This report covers only the few newspapers which have come under his personal inspection and does not represent the publicity the matter has had, but it will serve to give the members of the board some idea of the vast amount of information that can and is being disseminated in this Press Bureau department. Mr. Bill's report is as follows:

Press Bureau Report.

Name of Article.	No. of papers publishing.	Circulation
Corn judging contests	7	55,140
Problems of the soil	6	59,806
Supt. Hall's annual report	6	48,423
Report of resolutions	8	62,773
Highway talk, Fulkerson	3	21,781
Highway Engineer's talk	1	13,744
Second day of institute	2	15,694
Corn session	16	124,715
Cement on the farm, Crane	5	257,278
Ventilation of dwellings, Carter	14	144,322
Food problems, Bevier	12	13,744
Dignity of labor, Mather	13	159,796
Making the home, Dunlap	6	61,980
Agriculture in 2,500 schools	7	42,947
Teaching agriculture	8	42,664
Pig feeding, Pervier	4	10,647
Grout farm encampment	5	3,310
Farmers' educative movement	9	12,308
Hogs on 80 acres, Rowe	17	184,656
Failure of clover system	5	48,853
Concrete walk, how to lay	5	34,975
Pig feeding, new method of	8	158,100
*Seed corn treatment, Forbes	5	10,984
Soils, introduction	3	3,381
Farm waste, $750,000,000	4	30,977
An hour on the farm	4	29,858
Killing valuable birds	3	18,488
Farmer boys encamped	5	3,143
Long, strong life, Barlow	4	51,963
Success talk, Russell	5	24,262
Agriculture in Normals	7	13,044
*Corn pest conquered	19	104,311
Total circulation of 32 articles		1,733,103
Average		54,159

* It is our opinion that these articles were published in every newspaper of any importance in Illinois, and copied largely by papers in other states. We are also sure that many of the other articles received a wide circulation, and that the above figures do not represent one-half the circulation.

In this connection we wish to say that there are a number of papers being sent to the institute office now in exchange; that we have prepared a book in which to keep an accurate record of articles published, so far as they come under our observation, so that our next report will give a still better idea of the scope of this work.

Besides the regular articles that go out from the office, we have sent a column or a column and a half to each newspaper in 40 counties where institutes were to be held, in advance of the meeting. This we will continue to do whenever the program is sent to us in time for us to know whom to speak about.

Director Easterly stated that the matter of the expenses of the Williamson county institute were in somewhat tangled shape, the president of the institute having gone from the State. He said that an institute had been held and that there were some legitimate expenses that should be paid and on motion of Mr. Wyman, Mr. Easterly was instructed to pay all legitimate bills against the institute and forward the report for auditing.

The secretary stated that he had a plan by which all of the circulating libraries could be put into the field; that many of those in the office need overhauling and repairing before being sent out.

On proper motion, the secretary was authorized to secure whatever assistance necessary and get the libraries into the field as fast as the demands come in.

The bills for expenses of the delegates which were presented at the close of the conference were signed by the directors present or by the chairman of the executive committee. The secretary was instructed to forward any that might come in later to the auditor in the usual manner.

The superintendent and secretary were instructed to visit Peoria before printing the program and in connection with the Promotion Club of that city, locate the various meeting places for the sections and general meetings in order that they may be described in the printed matter to be sent out, and in the program.

On motion, the committee adjourned subject to the call of the president.

Approved by the board Feb. 25, 1908.

TRANSACTIONS OF THE CONVENTION OF DELEGATES PEORIA, ILL., FEBRUARY 11, 1908.

Report of the Committee on Credentials, Peoria, Ill., February 11, 1908.

To the Convention of Delegates, Illinois Farmers' Institute, Peoria, Illinois:

Gentlemen—We, your committee on credentials beg leave to report that we have examined the credentials of the delegates representing the varicus congressional districts, and find the following named persons entitled to seats in this convention:

Districts One to Ten, Inclusive.

Delegates—James Frake, C. P. Reynolds, Merrill K. Sweet.
Alternates—Charles W. Farr, John M. Clark, John M. Houseman.

District Number Eleven.

Delegates—J. C. Forbes, J. P. Mason, F. H. Hall, M. Long, George A. Hunt, George W. Conn, Jr., Frank Sprague, Dwight Milue, G. F. Sayler, W. H. Hill, C. H. Fellingham, A. X. Gable, Mark Havenhill, F. F. Funk, George Reynolds, W. R. Foster, George F. Tullock, Frank Johns, S. E. Hoisington.
Alternates—C. M. Pool, T. W. Esmond, G. A. Cruden.

District Number Thirteen.

Delegates—George Morris, Ed. Puterbaugh, R. B. Puterbaugh, J. H. Noggle, Scott Morris, F. D. Latham, W. R. King, Frank D. June, James Carmichael, A. N. Abbott, Allen Mathew, W. F. Powers.
Alternates—F. E. Fischel, George F. Brooks, William Peugh, J. H. Martin, C. A. Wetherbee.

District Number Fourteen.

Delegates—Wesley Ewing, A. O. Behuke, George Phipps, George R. Loudon, L. A. Duncan, Ben Bellinger.
Alternates—H. C. Stevenson, Mike Ruger, W. O. Hunkle.

DISTRICT NUMBER FIFTEEN.

Delegates—J. E. Simmonds, Ray Wheeler, S. N. Black, F. W. Scanlan, Snowden Laws, E. H. Diehl, R. C. Hanlon, M. M. Nash, R. F. Beals, Mrs. J. W. Whitson.

Alternates—Frank Lutz, Frank Baldwin, Ross Bartholomew, W. P. Kirkland, D. O. Hinman, John Miller.

DISTRICT NUMBER SIXTEEN.

Delegates—C. C. Pervier, Frank Jacoby, C. H. Lewis, R. R. Newburn, J. A. Shanklin, U. G. Cusac, G. R. Williams, W. B. Mills, Harley Zenor, Peter Sweitzer, John Kennel.

Alternates—Chas. Kelley, A. W. Bryant, P. J. Cassidy, L. E. Ingram, M. D. Malone, J. D. Ball, J. O. Winship, A. J. Robinson, Peter Morine.

DISTRICT NUMBER SEVENTEEN.

Delegates—W. F. Mottier, U. G. Way, Thomas Whalen, John A. Bruce, Omar P. Wagner, Andrew Layman, S. J. Woland, William Bauman, H. E. Starkey, John Zeiter, C. L. Mayes, E. E. Jones, E. F. Coolidge, Frank Benjamin, Richard J. Dickinson, Howard Leonard.

Alternates—John Whalen, Wesley Proter, Oscar E. Wagner, George A. Wieber, D. R. Bowles, M. A. Crane, W. F. Young, Guy Hilton, C. E. Hill.

DISTRICT NUMBER EIGHTEEN.

Delegates—J. A. Sweet, J. J. Meehling, Joseph E. Lutz, C. D. Smith, A. J. Gillfillan, Elmer Koon, F. A. Caveney.

Alternates—William Crummine,, I. W. English, J. Q. Snedeker, Homer Custer, J. C. Sailor, Lyman Johnson,

DISTRICT NUMBER NINETEEN.

Delegates—Joseph Carter, C. E. Norton, I. S. Raymond, Roscoe Farrar, Harvey Ames, John Paul Jones, C. M. Weller, E. A. Moyer, E. L. Hoffman, J. Frank Zeigler, Claude W. Thorp, D. E. Bert, Miss Lenora Bowman, J. B. Burrows, W. L. Rhodes, Harm Sharp, J. C. Hoke, W. W. Royer, Seymore Manquis, L. W. Wise, W. E. Killam.

Alternates—H. F. Hill, J. O. Toland, Chas. Hutton.

DISTRICT NUMBER TWENTY.

Delegates—George H. Wiemer, George B. Mathers, J. G. Spaits.

DISTRICT NUMBER TWENTY-ONE.

Delegates—Patrick Ryan, A. B. Kirk, S. Schrantz, W. J. H. Fahrenkrog, S. R. Winchester, Frank Bauer, W. C. Newberry, E. C. Richards, T. T. Smith, J. A. Leland, J. O. Humphrey, E. C. Pruitt.

Alternates—John Schrantz, Henry Gebhart, Ed. Minnis, F. E. Baker, Joseph Chappel, P. H. Dorsey, Jr., Abe Brokaw, Andrew P. Hughes, William Beatty, Sidney Smith, F. W. Ladage, Chas. Darnell.

DISTRICT NUMBER TWENTY-TWO.

Delegates—Armond Zeller, Joel Williams, Balser Schmidt, J. G. Schneider, Herman Mueller.

DISTRICT NUMBER TWENTY-THREE.

Delegates—O. L. Wakefield, N. F. Goodwin, Tell Trimble, Joseph Danks, John Laatseh, C. E. Mitchell, George C. Mattes, Joseph Oldfield, H. J. Belknap, D. R. Love, Charley Clark, Jerry Dunn, J. I. McCarty, Dan Mills, C. E. Jones, E. A. Phillips, John Mantz, Frank Britton.

Alternates—A. J. Henderson, Virgil Walker, Ivan Plunkett, Albert Ruff, F. L. McWilliams, Lewis Hails, Charles E. Cox, A. J. Dunlap, W. E. Colvin, John Lucas.

DISTRICT NUMBER TWENTY-FOUR.

Delegates—Albert Moye, Henry Hewitt, Jessie McLain.

DISTRICT NUMBER TWENTY-FIVE.

Delegates—John A. Wilson, Miss Rebecca Davis, H. G. Easterly, R. B. Templeton, A. H. Evans, W. R. Braden, N. R. Lessley, J. C. Foster, — Foster, George D. Rich, William F. Jinnette.

Alternates—Robert Timpner, W. E. Braden.

Respectfully submitted,
RALPH ALLEN,
R. W. CHITTENDEN,
F. I. MANN,
Committee.

On motion the report of the committee was adopted.

The delegates representing the odd numbered congressional districts held their elections and reported to the convention the election of directors for the ensuing term as follows:

1st Dist.—C. P. Reynolds, 166 Adams St., Chicago, Ill.
3rd Dist.—M. K. Sweet, Glenwood, Ill.
5th Dist.—John M. Houseman, 919 Millard Ave., Chicago.
7th Dist.—Chas. W. Farr, 2397 N. 42d Court, Chicago.
9th Dist.—J. F. Rehm, 1768 Deming Court, Chicago.
11th Dist.—J. P. Mason, Elgin, Ill.
13th Dist.—A. N. Abbott, Morrison, Ill.
15th Dist.—S. N. Black, Clayton, Ill.
17th Dist.—S. B. Mason, Bloomington, Ill.
19th Dist.—J. B. Burrows, Decatur, Ill.
21st Dist.—Edward Grimes, Raymond, Ill.
23rd Dist.—A. V. Schermerhorn, Kinmundy, Ill.
25th Dist.—W. E. Braden, Cutler, Ill.

The *ex officio* members are as follows:

Superintendent of Public Instruction, Hon. F. G. Blair, Springfield.
Dean of the College of Agriculture, Dr. Eugene Davenport, Urbana.
President State Board of Agriculture, George H. Madden, Mendota.
President State Horticultural Society, R. O. Graham, Bloomington.
President State Dairymen's Association, L. N. Wiggins, Springfield.

Delegates from the 19th district presented the following resolution and moved its adoption:

WHEREAS, It has pleased a Divine Providence to remove from us since our last annual meeting, Mr. E. E. Chester, and

WHEREAS, He has been our director ever since the present district was organized, we, the delegates of the 19th district feel that we wish to present the following:

Resolved, That in the death of Mr. E. E. Chester, we have each lost a personal friend and wise leader; the cause of agricultural education has lost a pioneer whose industry and enthusiasm has ever kept him in the front rank as to practical farm management and scientific investigation. We feel that the State and country has indeed lost a strong man.

We ask that this resolution be made a part of the record of this meeting, and that a copy be sent to his bereaved family by the secretary.

Unanimously adopted.

Fitting eulogies were spoken by Prof. Joseph Carter, President Farr and former President Schermerhorn.

There being no further business before the delegates, on motion, the convention adjourned.

Approved by the board Feb. 25, 1908.

SYNOPSIS OF THE MEETING OF THE BOARD OF DIRECTORS OF THE ILLINOIS FARMERS' INSTITUTE.

Held in the Supreme Court Room, State House, Springfield, Ill., February 25, 1908.

The meeting was called to order by President Chas. W. Farr, at 10:00 o'clock a. m., and those responding to roll call were: Directors Abbott, Allen, J. B. Burrows, E. W. Burroughs, Chittenden, Easterly, Farr, Frake, Grimes, Grout, Miner, McCartney, Mann, J. P. Mason, S. B. Mason, Sweet and Wiggins.

The minutes of the previous meeting were approved as printed, and the minutes of the meetings of the executive committee were read and approved.

On motion of Mr. Allen, the standing committees that were not ready to present reports, were instructed to prepare reports and file them with the secretary for the records.

Chairman Allen of the committee on soil investigation and experiments, submitted an extended report and 40,000 copies were ordered to be printed in pamphlet form for distribution.

Mr. E. W. Burroughs, chairman of the highway committee, reported at length and the report was placed on file for record.

Superintendent Hall reported, making suggestions and recommendations all of which were adopted and the report filed.

The secretary reported, giving statistics pertaining to the press bureau work, the finances, county institute reports and libraries. The report was placed on file.

On motion, recess was taken to 1:30 o'clock p. m.

At 1:30 o'clock p. m. the meeting was called to order and the membership roll for 1908-9 was called, the following named members answering: Abbott, Allen, Black, E. W. Burroughs, J. B. Burrows, Chittenden, Farr, Frake, Graham, Grimes, Grout, Miner, McCartney, Mann, J. P. Mason, S. B. Mason, Sweet and Wiggins.

Mr. Abbott, chairman of the legislative committee, addressed the meeting on matters pertaining to the work of the ensuing term.

The report of the convention of delegates was read and the membership roll for 1908-9 verified and approved.

On motion, ex-members, newspaper representatives and visitors were extended the courtesies of the meeting.

The president appointed as tellers, Mr. Grout and J. B. Burrows and the election of officers proceeded. On the second formal ballot Mr. J. P. Mason received a majority of the 18 votes cast for president, and on motion of Mr. Abbott, who had received the next highest vote, the election of Mr. Mason was made unanimous.

The ballot for vice president was spread and on the first formal vote, Mr. A. N. Abbott received a majority, and on motion of S. B. Mason, who received the next highest vote, the election of Mr. Abbott was made unanimous.

On proper motion, the secretary was instructed to cast the unanimous vote of the members present for Frank H. Hall for superintendent. The instruction was obeyed and the election of Mr. Hall recorded. In like manner, Mr. A. P. Grout was elected treasurer, Frank I. Mann, auditor, the president casting the ballot for H. A. McKeene for secretary.

Mr. Nicholas Roberts, president of the Springfield Chamber of Commerce, Mr. A. Bowen, Mr. D. W. Smith and Mr. Dirksen, all of Springfield, addressed the meeting in behalf of that city and invited the board to locate the next annual meeting in Springfield.

Communications from President James of the University of Illinois, Dean Davenport of the College of Agriculture, president of Champaign Chamber of Commerce, and others, asking the meeting for Champaign, were presented, as was a number of like character from Rockford, representing that city and the Winnebago county farmers' institute.

After thorough discussion, the board decided, by ballot, that Rockford was first choice, Springfield next and Champaign next. The matter was placed in the hands of the executive committee with instructions to locate the meeting at Rockford, provided the people of that city meet the requirements; otherwise the second choice is to have the opportunity.

Mr. Burnett was given five minutes time in which to speak about books on agriculture and the farmer's library. At the close of Mr. Burnett's remarks, on motion, a committee of three was appointed whose duty it shall be to investigate and recommend to the board suitable books for the study of agriculture.

Directors Mann, Abbott and Farr were selected to serve on this committee.

The secretary was instructed to transfer $150 from fund No. 4 to fund No. 7.

On motion of Mr. Sweet, $75 was appropriated for the purpose of holding an institute in the 7th district in Cook county.

Directors Mason and Wiggins were appointed to interview Secretary of State Rose in regard to permanent rooms in the Capitol for the institute.

The superintendent's salary was fixed at $1,500 for seven months.

On motion $700 was appropriated for use in securing special speakers for institute work, under the direction of the superintendent.

On motion $650 was appropriated for the domestic science work, the same to be expended under the direction of the domestic science committee, and $1,000 for press bureau work, under the direction of the executive committee.

Director Wiggins reported that Secretary Rose did not care to meet the committee appointed to interview him, and the matter was referred to Director McCartney, with instructions for a report.

The resolutions adopted by the State institute at Peoria were discussed and endorsed and special emphasis was placed upon that one "favoring such change in the school law as will make it necessary, after January 1, 1910, for all applicants for a teacher's certificate in Illinois to pass examination in elementary agricultural science."

THE SUPERINTENDENT'S SUGGESTIONS THAT WERE ADOPTED.

1. The printing (after this year) of the report of the superintendent, of the secretary of the press bureau work, of the chairmen of the standing committees and of the directors in the districts in which institutes are held, for distribution a few days prior to that meeting of the board next after the annual state institute.
2. The encouragement of the one-day institute feature of our work and school visitation by our speakers in all towns in which institutes are held.
3. The district institute to be held in connection with the county institute in each county in which there is a State normal school, the institute to be held in the normal school building at a time when the school is in session.
4. Continued effort for such modification of the school law as will place elementary agriculture on the list of studies required for certification as teachers in the public schools.

REPORT OF THE COMMITTEE ON HIGHWAYS.

Feb. 25, 1908.

To the Board of Directors:

GENTLEMEN—Your committee begs to submit the following report of its work and findings for the past year:

We have been chiefly concerned in coöperating with the Illinois Highway Commission and in noting the progress of its work. As a result of this coöperative work, your committee believes that a greater interest in the subject of improved earth roads and bridges has been aroused than ever before in the history of the State. As an evidence of this, attention is called to the fact that a few years ago so little interest and effective coöperation could be secured that the majority of the directors of institutes would not put road subjects on the programs. A year ago 67 requests were sent out to the State Highway Commission for speakers. As the work of the commission was hardly organized it was found impossible to get speakers to send to more than 40 of these institutes. This past year requests were received from all but two counties and the Highway Commission has furnished speakers for 108 institutes. A number of the counties where more than one institute was held asked for the road topic in each instance.

The influence of this committee has been exerted to impress the importance of better methods of maintenance of our earth roads, which work has been most thoroughly undertaken by the Highway Commission. Perhaps the most important step in this matter was the passage by the Legislature of what is known as the road drag law. A draft of this law was submitted to your committee who gave the subject careful consideration, and after conferring on the matter with the State Highway Commission a bill was introduced into the Legislature and became a law in accordance with the recommendations submitted, with the exception that the clause providing that the dragging should be done in accordance with the instructions of the State Highway Commission was omitted, and in place thereof there was substituted the clause that the dragging should be done in accordance with the instructions of the township commissioners. This change your committee believes to have been an unwise one although it may not result in very much practical difference.

The State Highway Commission has issued a bulletin giving the full text of the law and explicit directions concerning the use of the drag, so that there can be no opportunity for any one doing this work in any other way than the proper way. There have been distributed 75,000 copies of the bulletin concerning the road drag and at present a fourth edition of 25,000 is being distributed.

Much interest has been aroused in the subject of improved bridges, and this your committee believes to be of great importance and is pleased to note the progress in this branch of the work which has been carried on by the State Highway Commission, particularly in the use of reinforced concrete construction for all small bridges.

No matter what kind of road, bridges are necessary. It is the opinion of your committee that this subject, which is of importance to every township, should receive first attention to the end that as soon as possible all of the small span bridges, that is, up to 40 or 50 feet, should be replaced as rapidly as possible with reinforced concrete structures. The result of this policy would be that in a very short time townships would do away entirely with a large part of their present bridge tax and would have this money available for other purposes.

Your committee would call attention to the important investigations that the Highway Commission is making on the subject of reinforced concrete bridges. There has been constructed in coöperation with the authorities at the Southern Illinois Penitentiary a full sized reinforced concrete bridge. This bridge has a span of 40 feet and a clear roadway of 18 feet. It was built by convict labor so that the cost of the State has been but a few dollars for the necessary amount of reinforcing rods, cement and sand. The Highway Commission proposes to carry on a series of tests on this bridge which will bring out many points of scientific value.

In addition to this phase of the value of the test, your committee believes that there will be another feature which is quite as important and valuable, namely, the great amount of public interest such a test will arouse. When it is realized the loads that bridges of this construction can bear, increased confidence will be inspired in the public mind in this form of construction.

Your committee is informed that this is the largest test of this kind ever undertaken in this country and is one that will attract attention not only of the engineers, but of all who are interested in the rural bridge construction. Your committee is in receipt of an invitation from the State Highway Commission to be present at some of these tests and will submit a further report on this matter.

There is one feature of the road improvement agitation of which much is heard at present and one which your committee believes should not pass without comment, that is in reference to the construction of through roads. Such roads we believe are not at present required by the people throughout the State generally, that in the absence of radial roads extending for a few miles in different directions from the various centers toward which travel goes, consideration of any plans for through roads is at present premature and is wasting uselessly, energy which had far better be applied towards agreeing on various points and submitting plans to secure well constructed radial roads.

There is no question but that in the vicinity of the larger towns and cities where travel is concentrated on the roads immediately adjacent, the ordinary earth roads do not suffice for such heavy traffic, and that under these conditions it would be necessary to make a more durable form of construction either of gravel or macadam. Moreover, on all roads where there is a large amount of traffic, money spent in durable road improvement is a good investment for that community. The fact, however, that the people in the towns are equally interested in having trade attracted into town and therefore have a substantial reason for wanting the roads roundabout improved, it would seem that the proper plan for having such road improvement would be such as would make it possible for coöperation of the people in the cities with the people in the country, each to bear a certain portion of the expense.

We would call special attention to the Randolph County Roard Commissioners' Organization which is an association of the highway commissioners of that county which meets once or twice a year for the purpose of discussing road work.

At these meetings they have secured speakers from the State Highway Commission, and elsewhere. The meetings have been well attended and of interest and value to all who participated.

We believe that such associations should be formed in every county in the State and include all officials who have to do with either road or bridge construction.

If it is necessary for the organizatin of such associations we would recommend the passage of such legislation as would effect this purpose and would recommend that officials attending these meetings or road institutes should be allowed their per diem charge together with their traveling expenses. Whatever money the taxpayer was called upon to spend in this way could not be put to a more profitable use.

Your committee has made itself thoroughly conversant with all the phases of the work if the Illinois Highway Commission and bespeaks for it the hearty support and coöperation of citizens in all parts of the State.

Approved by the board Feb. 25, 1908.

REPORT OF CONFERENCE AND EXECUTIVE COMMITTEE MEETING HELD AT THE NELSON HOUSE IN ROCKFORD, ILL., MAY 11, 1908.

In accordance with a call issued jointly by President Chas. W. Farr and President-elect J. P. Mason, the executive committee met as above stated for the purpose of conferring with parties interested in securing the fourteenth annual meeting of the Illinois Farmers' Institute for Rockford, and for forming a local organization for the promotion of the same. Those present in addition to the members of the committee were: The officers of the Winnebago county farmers' institute and of the Rockford Merchants' and Business Men's Association, Superintendent O. J. Kern of Winnebago county schools, Mrs. K. M. McCurry, president of the Winnebago county association of domestic science, the president of the Illinois association, the superintendent of institutes, the secretary, Mrs. F. H. Hall and several citizens of Rockford, while the press was well represented. The Rockford people assured the committee that Rockford would do her part toward making the meeting a success, and inaugurated the work by selecting a committee of seven of their number who shall have charge of the work, appoint subcommittees, etc., and report to the institute in due course. The committee selected is as follows: S. E. Hoisington, Frank Johns, James Joslin, Roy W. Burritt, Geo. F. Tullock, W. L. Frisbie and Mrs. K. M. McCurry.

This committee then invited the executive committee to inspect the various halls available for use of the institute meeting, and the following named places were found to be suitable.

The armory, north Church street, the memorial hall, north Main street, and the Unity hall, corner of Main and Mulberry streets.

The armory will seat about 1,200 persons and is suitable for use in holding the general sessions. The lower floor of this building is suitable for the display of implements and machinery. The Memorial hall is adapted for use of the agricultural experiment exhibit, and for sectional meetings, illustrated lectures, etc. The audience room will seat about 450 persons. The Unity hall is admirably adapted to the use of the association of domestic science—will seat about 350 persons and has in connection a large and well equipped kitchen. All of these places are in close proximity to each other and but a few moments walk from any of the best hotels.

After inspecting the buildings, the committee convened and formally accepted the invitation of the Winnebago county people to hold the fourteenth annual meeting in Rockford, and the dates selected are February 23, 24, 25, 1908.

The committee revised the "speakers' list," making such changes as seemed necessary on information furnished by reports from speakers and directors. The outline of a tentative program for the State meeting was suggested, plans made and the superintendent authorized to take up the matter of perfecting the work.

The secretary made a statement as to the condition of the finances, of which the following is a summary.

	Fund No. 1.	Fund No. 3.	Fund No. 4.	Fund No. 7.	Balance.
July 1, 1907	$ 453 49	$852 46	$ 882 88	....	$2,188 83
Appropriation	3,000 00	....	5,000 00	$500 00	8,500 00
Total	$3,453 49	$852 46	$5,882 88	$500 00	$10,688 83
Expenses	2,394 53	398 50	5,451 30	375 18	8,622 51
Balance May 11	$1,058 96	$453 96	$428 58	$124 82	$2,066 32

One hundred and fifty-three libraries have been handled during the season and all are in the field. It was also reported that within a few weeks the institute would be in possession of all the rooms of the department at headquarters, and that some changes should be made to fit them for use of the board and the work of the office.

On motion, the president and the secretary were authorized and instructed to have made such changes as they may deem advisable, and to furnish the rooms for the convenience of the board and the work, using funds for this purpose as may be available.

The president and the secretary were instructed to investigate the advisability of the use of the camera for securing farm views, views of live stock, cement construction and crop conditions for illustrating reports, bulletins, etc., and to purchase a first class outfit, if after investigation, the plan seemed practical and profitable.

On motion the committee adjourned to meet at the call of the president.

REPORT OF JOINT MEETING OF THE DOMESTIC SCIENCE COMMITTEE AND THE OFFICERS OF DOMESTIC SCIENCE, HELD AT DECATUR, ILL., MAY 27, 1908.

This conference was called by the chairman of the domestic science committee, Director J. B. Burrows, and the president of the association, Mrs. H. A. McKeene. The conference convened in the office of Lenora F. Bowman, superintendent Macon county schools, in the court house, at 2:00 o'clock p. m., on the date above mentioned. Those present were:

Chairman J. B. Burrows; Directors S. B. Mason, A. V. Schermerhorn and President-elect J. P. Mason of the committee, and Mrs. McKeene, Mrs. Aikman and Mrs. Barlow, officers of the association. The institute secretary was present to record the minutes of the committee, and Mrs. Barlow served in like manner for the association.

The purpose of the conference, as explained by the chairman, was to plan the work of the department of household science for the ensuing year and to formulate recommendations to the board of directors and to the association, which, if adopted, will make for the best interest of all concerned.

It was the unanimous opinion of the conference that something should be done to bring the work of the department into closer affiliation with the institute; something should be done that would correct the mistaken idea, in the minds of many ,that the association is not a part of the institute, and, after lengthy discussion, it was decided that the constitution should be revised and made to more fully meet the exigencies of modern methods and conditions; therefore, by unanimous vote the conference decided to recommend the repeal of the present constitution, and the adoption of the following:

REVISED CONSTITUTION.

ARTICLE I—NAME.

SECTION 1. The name of this organization shall be "Department of Household Science, Illinois Farmers' Institute."

Sec. 2. This department shall be affiliated as an auxiliary with the Illinois Farmers' Institute.

ARTICLE II—OBJECTS.

SECTION 1. The object of this department shall be to work in harmony with the Illinois Farmers' Institute and county farmers' institutes throughout the State of Illinois, along lines in which they are interested; it shall encourage and assist in the organization of local household science departments and clubs in every county, whose duty it shall be to coöperate with the county farmers' institute in arranging programs and exhibits for the meetings, and to encourage the young people to become interested and take part in the institute and department work.

Sec. 2. It shall endeavor to stimulate interest in all that pertains to home making and housekeeping; encourage the organization of parent and teacher's clubs in school districts, and mothers' clubs and domestic science clubs wherever possible, for the study of the problems of the home and school, and withall, to labor for the introduction of the study of household science and art into our educational system.

ARTICLE III—MEMBERSHIP.

SECTION 1. Any woman in Illinois desiring to assist in promoting the objects of this department may become a member.

ARTICLE IV—OFFICERS.

SECTION 1. The officers of this department shall be a president, a vice president and a secretary.

Sec. 2. The duties of the officers shall be such as usually devolve upon such officers, and which may hereafter be delegated to them by the executive board of the department.

Sec. 3. In the discharge of their duties, the officers and executive board shall be guided by Robert's Rules of Order.

ARTICLE V—ELECTION OF OFFICERS.

SECTION 1. The officers of the household science department of the Illinois Farmers' institute shall be elected by ballot at the annual meeting of the department, held at the same time and place and in connection with the State meeting of the Illinois Farmers' Institute.

Sec. 2. Each county household science department, each parent and teacher's club, each mother's club, each domestic science club and each woman's club in Illinois shall be entitled to two votes in the election of department offiers.

Sec. 3. Each organization desiring to take part in the election of officers must be represented by duly authorized delegates. Voting by proxy shall not be permitted.

Sec. 4. In counties where there are no departments or organizations affiliating with the State department, the president of the county farmers' institute shall have power to appoint two delegates to represent the women of his county at the annual meeting of this department.

Sec. 5. Nothing in this constitution shall be so construed as to prevent any woman in Illinois from attending all sessions of the department meeting and taking an active part in the discussions.

ARTICLE VI—EXECUTIVE BOARD.

SECTION 1. The president, vice president and secretary of this department, together with the domestic science committee of the Illinois Farmers' Institute shall constitute the executive board of the department.

Sec. 2. The duties of the executive board shall be to plan the work of the department for the year, make all by-laws, rules and regulations not provided for in this constitution, recommend the appropriation of funds for use of the department, authorize the expenditure of the same, and submit a written report of its proceedings to the board of directors of the Illinois Farmers' Institute for approval.

Sec. 3. The secretary of the Illinois Farmers' Institute shall draw his warrant on the funds of the department only upon receipt of an itemized bill, signed by the chairman of the executive board and the secretary of the department of household science, the same having been approved by the auditor of the Illinois Farmers' Institute.

ARTICLE VII—AMENDMENTS.

This constitution may be amended at any meeting of the department when such proposed amendment shall have been duly recommended by the executive board.

It was decided by vote of the conference, that, inasmuch as the association had been working for some years under a constitution obsolete in many of its provisions, the work of the future should conform to the provisions of the above recommended articles, until the same, or some other, be adopted by the department, and the board of directors of the institute.

The president of the department made a verbal report of the conference with interested persons in Rockford, in which she gave information as to the place selected in which to hold the eleventh annual meeting, the conveniences that will be available, and the coöperation which may be expected on the part of the Rockford and Winnebago county people.

Suggestions were made with reference to the program for the annual meeting, plans were discussed, and the officers of the department instructed to complete them.

The institute secretary was instructed to have 3,000 copies of the revised "Classified Food List" printed, also 10,000 copies of the department's report or "Year Book," as per copy submitted, the same to be corrected so as to harmonize with the recommended constitution.

Other recommendations agreed upon by the conference were:

1. That the proper authorities at the College of Agriculture, University of Illinois, be requested to mention the "Housekeeper's Conference" or "Two Weeks' Course in Household Science," in their circular announcing the annual stockmen's convention in January.

2. That each active county department of household science be allowed one representative at the district conferences in the future.

3. That the secretary of the department be paid the sum of $15.00 per month for services as secretary and librarian.

4. That the board of directors appropriate the sum of $1,000 for the use of the department in carrying out the plans for the year's work.

On motion, the conference, which, under the new constitution, becomes the "executive board of the department of household science, Illinois Farmers' Institute," adjourned to meet at the call of the chairman.

FINANCIAL STATEMENT.

To the Board of Directors of the Illinois Farmers' Institute:

GENTLEMEN—As your secretary, I beg leave to submit the following financial statement showing claims that have been allowed by your auditor, and warrants recommended by him in payment of the same:

Warrant number.	To Whom.	For What.	Fund number.	Amount.
513	Adams Express Co	Express charges	1	$ 1 80
514	American Express Co	..do	1	2 00
515	Inter-State Telephone Co	Service and toll	1	11 30
516	Western Union Tel. Co	Messages	1	2 29
517	Postal Tel. & Cable Co	..do	1	25
518	M. K. Weems & Co	Towel supply	1	60
519	Coe Bros	Neostyle supplies and repairs	1	14 20
520	H. A. McKeene	Cash advanced for postage and expenses	1	18 55
521	The News Engraving Co	13 half-tones for annual report	4	40 80
522	Daisy Mullen	Reporting State meeting	4	117 75
523	A. J. Bill	Press Bureau, 2,880 words	4	16 50
524	B. F. Wyman	Expenses as director	4	26 82
525	J. F. McCartney	..do	4	21 91
526	A. V. Schermerhorn	..do	4	15 46
527	J. L. Miller	Expenses as delegate, 25th Dist. Conf	4	3 62
528	B. S. Spaulding	..do	4	1 70
529	Wm. F. Jinnette	..do	4	2 85
530	Geo. D. Rich	..do	4	3 00
531	Wm. M. Beattie	..do	4	5 45
532	John B. Moore	..do	4	5 75
533	N. R. Lessley	..do	4	6 75
534	B. R. Moore	..do	4	3 90

Approved July 8, 1907.

Warrant number.	To Whom.	For What.	Fund number.	Amount.
535	H. A. McKeene	Postage	1	$ 5 00
536	Elizabeth Goldstein	Salary as stenographer	1	83 33
537	Smith-Premier Typewriter Co.	6 ribbon coupons	1	3 50
538	John Underfanger	Freight and drayage	1	2 16
539	W. A. Pavey, Agent	1 Monarch typewriter	1	90 00
540	Illinois State Penitentiary	Office chairs	1	37 00
541	George J. Foster	Expenses as director	4	2 75
542	J. P. Mason	..do	4	53 3[illegible]
543	George F. Harris	Delegate to 14th District Conference	4	5 95
544	W. E. Spicer	..do	4	2 16

Financial Statement—Continued.

Warrant number...	To Whom.	For What.	Fund number...	Amount.
545	Aaron W. Miner	Delegate to 14th District Conference	4	$12 30
546	W. B. Marvel	Expenses as director	4	3 62
547	William H. Ashdown	Delegate to 14th District Conference	4	4 00
548	J. E. Stickle	..do.	4	2 16
549	G. W. Dean	Delegate to 15th District Conference	4	19 80
550	R. C. Hanlon	..do.	4	1 98
551	S. N. Black	..do.	4	4 67
552	James Richey	..do.	4	90
553	John W. Head	..do.	4	90
554	F. W. Scanlon	..do.	4	95
555	W. F. Whitson	..do.	4	3 26
556	W. G. White	..do.	4	1 98
557	J. H. White	Delegate to 16th District Conference	4	1 68
558	J. A. Shanklin	..do.	4	2 07
559	Gardner Williams	..do.	4	3 35
560	C. C. Pervier	..do.	4	1 10
561	W. G. Nelson	..do.	4	4 35
562	W. B. Mills	..do.	4	4 10
563	R. F. Graham	..do.	4	1 43
564	W. T. DuMars	..do.	4	1 43
565	Peter Sweitzer	..do.	4	1 25
566	R. R. Newburn	..do.	4	4 75
567	Asa E. Burger	Delegate to 17th District Conference	4	4 21
568	V. G. Way	..do.	4	2 45
569	S. J. Woland	..do.	4	1 70
570	H. E. Starkey	..do.	4	1 70
571	F. W. Benjamin	..do.	4	1 00
572	Guy Hilton,	..do.	4	1 00
572	G. H. Mason	..do.	4	4 04
574	J. J. Meehling	Delegate to 18th District Conference	4	7 34
575	Morris Logue	..do.	4	7 34
576	J. J. Southworth	..do.	4	1 70
577	J. A. Taylor	..do.	4	1 80
578	W. W. Rothgeb	..do.	4	4 80
579	Thomas Clifton	..do.	4	4 74
580	E. J. Viall	..do.	4	4 74
581	Alden Snyder	..do.	4	5 38
582	W. H. Catey	..do.	4	4 57
583	W. H. McFadden	..do.	4	4 57
584	George W. Brown	..do.	4	4 82
585	C. D. Smith	..do.	4	5 82
586	E. A. Moyer	Delegate to 19th Distr.ct Conference	4	3 20
587	Frank E. Sawyer	..do.	4	2 79
588	Hardy F. Hill	..do.	4	3 20
589	W. L. Rhodes	..do.	4	4 66
590	J. C. Hoke	..do.	4	5 53
591	J. B. Burrows	..do.	4	2 25
592	Harvey N. Ames	..do.	4	2 60
593	Joseph T. Kelly	..do.	4	5 51
594	W. E. Killam	..do.	4	4 97
595	Aug. Klasing	Delegate to 22nd District Conference	4	2 54
596	Rufus Curthis	..do.	4	1 75
597	F. Dressor	..do.	4	1 50
599	Fred Keck	..do.	4	1 20
598	Frank E. Culp	..do.	4	1 55
600	Alvin O. Eckert	..do.	4	1 20
601	A. V. Schermerhorn	Expense of 23d District Conference	4	46 01
602	J. F. McCartney	Expense of 24th District Conference	4	49 03
603	H. G. Easterly	Expense as director	4	38 32
604	John A. Wilson	Delegate to 25th District Conference	4	3 80
605	W. E. Braden	..do.	4	6 47
606	Mrs. I. S. Raymond	Fxpense account of Domestic Science	7	12 26

Approved July 29, 1907.

Financial Statement—Continued.

Warrant number.	To Whom.	For What.	Fund number.	Amount.
607	Pacific Express Co	Express charges	1	5 68
608	United States Express Co	..do	1	4 40
609	American Express Co	..do	1	9 99
610	Western Union Telegraph	Messages	1	1 55
611	Consolidated Press Clip. Co	Fee for July	1	1 67
612	John Underfanger	Freight and drayage	1	60
613	Adams Express Co	Express charges	1	5 42
614	M. K. Weems & Co	Towel supply	1	60
615	Coe Brothers	Office supplies	1	11 00
616	A. N. Abbott	Expenses as director	4	11 08
617	E. W. Puterbaugh	Expenses 13th District Conference	4	4 42
618	W. G. Curtiss	..do	4	4 65
619	Fred A. Richardson	..do	4	1 31
620	W. R. Hostetter	..do	4	5 41
621	Horace G. Kauffman	..do	4	4 00
622	Theo. F. Ellis	..do	4	3 37
623	Z. T. Turner	..do	4	3 05
624	Abram Ackert	..do	4	75
625	Wm. C. Pugh	..do	4	1 45
626	Ralph Allen	Expenses as director	4	3 65
627	George C. Cutler	Expenses 14th District Conference	4	4 71
627	Edward Grimes	Expenses as director	4	6 84
629	S. R. Winchester	Expenses 21st District Conference	4	4 60
630	T. T. Smith	..do	4	5 94
631	J. A. Leland	..do	4	75
632	Leogh F. Maxcy	..do	4	75
633	J. H. Pervine	..do	4	2 71
634	S. Schrantz	..do	4	1 83
635	W. E. Holben	..do	4	1 82
636	J. P. Mason	Expenses as director	4	2 50
637	F. E. Thayer	Expenses 11th Distrist Conference	4	2 64
638	D. Hutchinson	..do	4	2 60
639	Robert Eaton	..do	4	2 60
640	Guy Phillips	..do	4	2 00
641	Phil S. Harrison	..do	4	3 25
642	A. P. Grout	Expenses of 20th District Conference	4	44 60
643	B. F. Wyman	Expenses as director	4	4 08
644	Charles Bennett	Expenses 12th District Conference	4	3 57
645	Chas. E. Chena	..do	4	4 32
646	Geo. F. Fullock	..do	4	4 11
647	Roy W. Burritt	..do	4	4 10
645	Frank F. Funk	..do	4	4 45
649	C. M. Pool	..do	4	4 45
650	H. H. Parke	..do	4	2 88
651	E. Willmarth	..do	4	2 93
652	J. V. Jessup	..do	4	2 37
653	A. C. Gabel	..do	4	3 25
654	Frank H. Hall	Expenses as superintendent	4	103 59
655	Mrs. Jennie C. Barlow	Expenses I. A. D. S	7	18 25

Approved Aug. 14, 1907.

Financial Statement—Continued.

Warrant number...	To Whom.	For What.	Fund number...	Amount.
656	Adams Express Co	Express charges	1	$ 8 91
657	American Express Co	..do	1	3 36
658	United States Express Co	..do	1	3 65
659	Edw. F. Hartmann Co	Filing cases, furniture	1	52 00
660	Miss Elizabeth Goldstein	Salary for August	1	83 33
661	Schnepp & Barnes	Blanks, envelopes, programs	1	23 25
662	Consolidated Press Clipping Co	August services	1	5 00
663	H. A. McKeene	Postage (press work)	1	10 00
664	Geo. W. Smith, publisher	25 copies Students' History	3	25 00
665	J. L. Hudson & Co	1 warehouse truck	3	11 00
666	A. J. Bill	Press Bureau work	4	35 92
667	Mrs. Jennie C. Barlow	Expenses on account of I. A. D. S	7	21 50
668	Irvin Ingle	Expenses attending 16th Dist. Conf	4	7 36

Approved Sept. 6, 1907.

Warrant number...	To Whom.	For What.	Fund number...	Amount.
669	M. K. Weems & Co	For laundry	1	$ 0 60
670	Interstate Telephone Co	Telephone service	1	10 05
671	Monarch Typewriter Co	Typewriter ribbons	1	3 50
672	W. H. Cox	Drinking water	1	2 00
673	H. A. McKeene	Cash advanced for postage, etc	1	25 60
674	Elizabeth Goldstein	Salary for September	1	83 83
675	News Engraving Co	Cuts, etc	4	34 50
676	Edward Grimes	Expenses as director	4	8 20
677	T. T. Smith	Expenses attending 21st Circuit Conf	4	4 36
678	Leigh F. Maxcy	..do	4	75
679	Frank H. Hall	Expenses as superintendent	4	31 80
680	Joseph H. Carter	Services at three county institutes	4	30 00
681	H. A. McKeene	Expenses attending Executive Committee meeting and trip with Soil Committee	4	31 11
682	A. J. Bill	Press Bureau	4	50 16
683	Mrs. Jennie C. Barlow	Account of I. D. S. A	7	19 13

Approved Oct. 3, 1907.

Financial Statement—Continued.

Warrant number...	To Whom.	For What.	Fund number...	Amount.
684	American Express Co	Express charges	1	$ 6 40
685	Pacific Express Co	..do	1	2 00
686	United States Express Co	..do	1	2 99
687	Elizabeth Goldstein	Salary as stenographer	1	83 33
688	Edw. F. Hartmann Co	Pamphlet cases	1	4 20
689	Coe Bros	Office supplies	1	16 50
690	Schnepp & Barnes	Envelopes and programs	1	21 00
691	H. A. McKeene	Press Bureau postage	1	10 00
692	H. A. McKeene	Postage libraries	3	10 00
693	S. R. Winchester	Expenses Circuit Conf. 21st District	4	4 60
694	August Klassing	Expenses Circuit Conf. 22d District	4	1 06
695	Alvin O. Eckert	..do	4	1 90
696	Rufus Curtis	..do	4	5 72
697	Joel Williams	..do	4	5 32
698	Will M. Lockrone	Expenses of 23d District Conference	4	37 09
699	G. W. Dean	Expenses as director	4	11 22
700	Aaron W. Miner	..do	4	17 12
701	H. G. Easterly	.do	4	30 29
702	A. J. Bill	Services and expenses Press Bureau	4	63 84
703	Joseph Carter	Services	4	20 00
704	Thos. S. McClanahan, treas	Warren County Institute	5	73 69
705	F. S. Parrish, treasurer	Jackson County Institute	5	36 73
706	Robert Shumaker, treasurer	Knox County Institute	5	61 02
707	R. F. Graham, treasurer	Peoria County Institute	5	75 00
708	Harry Faulkner, treasurer	Mason County Institute	5	75 00
709	Mrs. Jennie C. Barlow	Services and expenses I. A. D. S.	7	27 40
710	C. M. Doyle, treasurer	Schuyler County Institute	5	47 50

Approved Oct. 28, 1907.

Warrant number.	To Whom.	For What.	Fund number.	Amount.
711	Frank H. Hall	Salary and postage, October	1	$224 28
712	American Express Co	Express charges	1	19 02
713	Pacific Express Co	..do	1	5 72
714	United States Express Co	..do	1	16 47
715	Western Union Telegraph Co	Message	1	33
716	W. H. Cox	15 gallons gravel spring water	1	1 50
717	H. A. McKeene	Postage, general	1	10 00
718	Johnston & Hatcher Co	11 yards linoleum, library room	3	16 50
719	Frank H. Hall	Expenses as superintendent	4	43 44
720	Joseph Carter	Services as lecturer	4	60 00
721	R. B. Young, treasurer	Wayne County Institute	5	61 11
722	J. E. Stickle, treasurer	McDonough County Institute	5	74 50
723	C. A. Marchildon, treasurer	Alexander County Institute	5	74 38
724	Howard Jokisch, treasurer	Cass County Institute	5	75 00
725	J. W. Brockhouse, treasurer	Morgan County Institute	5	48 75
726	C. G. Winn, treasurer	Pike County Institute	5	44 00
727	W. H. McFadden, treasurer	Cumberland County Institute	5	43 12
728	Edward Schneider, treasurer	Hardin County Institute	5	54 28
729	Anton Endress, treasurer	Clinton County Institute	5	56 30
730	J. A. Storment, treasurer	Marion County Institute	5	75 00
731	W. A. Lassater, treasurer	White County Institute	5	33 00

Approved Nov. 14, 1907.

Financial Statement—Continued.

Warrant number.	To Whom.	For What.	Fund number.	Amount.
733	Schnepp & Barnes	County institute programs	1	$16 00
734	Elizabeth Goldstein	Salary for November	1	83 33
735	H. A. McKeene	Cash advanced for postage	1	10 00
736	Pantagraph Ptg. & Sta. Co	5,000 lithograghed circulars	4	18 00
737	A. J. Bill	Services, press bureau	4	51 17
738	Chas. W. Farr	Expenses as president	4	11 25
739	Edward Grimes	Expenses as director	4	22 77
740	Martin Bray	Expenses as Delegate District Conf	4	3 24
741	W. R. Hostetter	Expenses as Delegate 13th Dist. Conf	4	1 68
742	Z. T. Turner	..do	4	1 50
743	W. G. Curtis	..do	4	3 00
744	Theo. F. Ellis	..do	4	2 51
745	E. W. Puterbaugh	..do	4	1 41
746	Abram Ackert	..do	4	75
747	B. F. Hendricks	..do	4	1 64
748	Fred A. Richardson	..do	4	1 31
749	Charles Walkup	..do	4	1 50
750	John W. Head	Expenses as Delegate to Peoria Conf	4	5 06
751	T. H. Castle	..do	4	5 06
752	E. H. Diehl	..do	4	4 18
753	W. G. White	..do	4	4 23
754	R. C. Hanlon	..do	4	4 48
755	R. R. Newburn	..do	4	7 25
756	Wm. J. Huston	..do	4	2 06
757	C. C. Pervier	..do	4	85
758	F. C. Jacoby	..do	4	7 70
759	Rich. J. Dickinson	..do	4	1 51
760	H. E. Starkey	..do	4	2 06
761	Howard Leonard	..do	4	2 26
762	Chas. E. Himmel	..do	4	2 15
763	J. G. Spaits	..do	4	1 73
764	R. H. Quick	..do	4	2 91
765	E. O. Gunn	..do	4	2 72
766	S. W. Snavely	..do	4	2 40
767	A. V. Schermerhorn	..do	4	13 12
768	H. A. McKeene	Expenses as Secretary Executive Com	4	4 48
769	Mrs. I. S. Raymond	Expenses account I. A. D. S	7	70 04
770	P. J. Valter, treasurer	Gallatin County Institnte	5	75 00
771	John Caspar, treasurer	Pope County Institute	5	75 00
772	J F. McCartney, treasurer	Massac County Institute	5	74 99
773	J. C. Hall, treasurer	Hamilton County Institute	5	75 00
774	Wm. H. Grissom, Jr., treasurer	Johnson County Institute	5	75 00
775	M. E. Shurtleff, treasurer	Edwards County Institute	5	72 39
776	W. J. K. Farenking, treasurer	Macoupin County Institute	5	75 00
777	J. A. Hindman, treasurer	Franklin County Institute	5	52 03
778	A. N. Johnson, on account of	..do	5	6 25
779	L. H. Coleman, treasurer	Sangamon County Institute	5	75 00
780	A. J. Dunlap, treasurer	Richland County Institute	5	75 00
781	C. E. Mitchell, treasurer	Effingham County Institute	5	75 00
782	G. W. Sharp, treasurer	Wabash County Institute	5	75 00
783	W. T. Frost, treasurer	Jefferson County Institute	5	75 00
784	D. M. Butler, treasurer	Saline County Institute	5	53 05

Approved Nov. 30, 1907.

Financial Statement—Continued.

Warrant number...	To Whom.	For What.	Fund number...	Amount.
785	Adams Express Co	Express charges (October, November)	1	$ 22 18
786	American Express Co	Charges for November	1	5 80
787	Pacific Express Co	..do.	1	90
788	U. S. Express Co	..do.	1	3 91
789	John Underfanger	Freight and drayage	1	35
790	Postal Telegraph & Cable Co	Message	1	25
791	M. K. Weems & Co	Towel supply	1	60
792	Coe Bros	Neostyle supplies	1	4 50
793	Inter-State Tel. & Tel. Co	Service to January, 1908	1	11 05
794	Frank H. Hall	Salary and postage	1	220 23
795	B. F. Wyman	Expenses as director	4	19 16
796	A. N. Abbott	..do.	4	8 82
797	Margaret B. Chester, estate of E. E. Chester	..do.	4	18 05
798	Aaron W. Miner	..do.	4	21 90
799	Frank H. Hall	Expenses as superintendent	4	25 87
800	Joseph Carter	Services, 11 institutes	4	110 00
801	A. J. Bill	Services and expenses, Press Bureau	4	109 15
802	J. H. White	Expenses on account of Peoria Conf.	4	2 53
803	C. L. Mays	..do.	4	2 15
804	Mrs. Jennie C. Barlow	Expenses on account of I. A. D. S	7	21 25
805	W. A. Lackey, treasurer	Pulaski County Institute	5	29 15
806	Wm. F. Jinnette, treasurer	Union County Institute	5	30 40
807	J. L. Miller, treasurer	Jackson County Institute	5	27 03
808	J. L. Wright, treasurer	Randolph County Institute	5	75 00
809	John Wertman, treasurer	Fulton County Institute	5	75 00
810	W. H. Bissell, treasurer	Mercer County Institute	5	48 33
811	E. E. McCoy	Brown County Institute	5	35 00

Approved Dec. 14, 1907.

Warrant number...	To Whom.	For What.	Fund number...	Amount.
812	H. A. McKeene	Postage and expenses	1	$23 85
813	Elizabeth Goldstein	Salary for December	1	83 33
814	S. B. Mason	Expenses as director	4	35 50
815	Ralph Allen	..do.	4	21 23
816	J. A. Shanklin	Expense on account of Peoria Conf.	4	1 67
817	Peter Sweitzer	..do.	4	1 15
818	A. V. Schermerhorn	Expenses as acting director	4	14 02
819	Joseph Carter	Services as lecturer	4	90 00
820	Reincke-Kreicker Co	7 half-tones, 4 etchings, Bull. 10	4	25 05
821	Mrs. Jennie C. Barlow	Expense on account of I. A. D. S.	7	25 50
822	O. L. Wakefield, treasurer	Crawford County Institute	5	75 00
823	C. D. Kirk, treasurer	Christian County Institute	5	75 00
824	B. F. Wyman, treasurer	DeKalb County Institute	5	75 00
825	Wm. W. Campbell, treasurer	Clay County Institute	5	75 00
826	Joseph Oldfield, treasurer	Fayette County Institute	5	75 00
827	Edward Grimes, treasurer	Montgomery County Institute	5	75 00
828	Geo. E. Davis, treasurer	Hancock County Institute	5	63 75
829	John Zeter, treasurer	Logan County Institute	5	75 00
830	Edwin O. Gunn, treasurer	Putnam County Institute	5	40 05
831	W. H. Kibler, treasurer	Jasper County Institute	5	71 20
832	R. L. Downey, treasurer	Jersey County Institute	5	70 30
823	E. G. Foster, treasurer	Shelby County Institute	5	52 75
834	M. K. Sweet, treasurer	Cook County Institute	5	8 50

Approved Dec. 26, 1907.

Financial Statement—Continued.

Warrant number...	To Whom.	For What.	Fund number...	Amount.
835	Adams Express Co	Express charges	1	$ 5 50
836	American Express Co	..do	1	11 23
837	U. S. Express Co	..do	1	10 14
838	Western Union Telegraph Co.	Message	1	25
839	Schnepp & Barnes	County Institute programs	1	24 00
840	W. H. Cox	Gravel Springs water	1	2 50
841	H. A. McKeene	Postage and expenses	1	13 10
842	American Multigraph Co	1 No. 2 multigraph and equipment	3	301 99
843	Frank H. Hall	Salary as Supt. and expenses	4	241 78
844	Henry Hinrichs, treasurer	Cook County Institute	4	15 91
845	Henry Hinrichs, treasurer	Cook County Farmers' Institute	5	66 50
846	Harvey N. Ames, treasurer	Coles County Institute	5	75 00
848	W. T. White, treasurer	Perry County Institute	5	75 00
847	J. C. Rainey, treasurer	Macon County Institute	5	75 00
849	Wm. G. Cole, treasurer	McLean County Institute	5	75 00
850	Wm. Whaples, treasurer	Bureau County Institute	5	75 00
851	B. C. Benedict, treasurer	Calhoun County Institute	5	65 00

Approved Jan. 14, 1908.

Warrant number.	To Whom.	For What.	Fund number.	Amount.
852	Pacific Express Co	Express charges	1	$ 2 37
853	Schnepp & Barnes	7,000 posters, 2 colors	1	26 00
854	Elizabeth Goldstein	Salary for January	1	83 33
855	Ben Goldstein	Services	1	2 00
856	H. A. McKeene	Cash advanced for postage, etc	1	38 00
857	Herman Goldstein	Work on libraries, 6 days	3	3 00
858	American Multigraph Co	Two electrotype signs	3	2 00
859	John Underfanger	Freight and drayage	3	4 01
860	H. G. Easterly	Expenses as director	4	16 00
861	A. J. Bill	Services press bureau	4	37 55
862	W. P. Holland	Expenses attending District Conference.	4	2 55
863	Jennie C. Barlow	Expenses Association Domestic Science	7	26 40
864	Elmer Buffum, treasurer	Stark County Institute	7	49 97
865	Jos. E. Lutz, treasurer	Clark County Institute	5	75 00
866	W. C. Slemmons, treasurer	Edgar County Institute	5	75 00
867	Lewis Hitchcock, treasurer	Iroquois County Institute	5	75 00
868	J. V. Jessup, treasurer	Kendall County Institute	5	75 00
869	J. J. Schwarzentraub, treas	Tazewell County Institute	5	75 00
870	S. L. Woodburn, treasurer	Rock Island County Institute	5	68 65
871	H. K. Seed, treasurer	Lawrence County Institute	5	73 25
872	J. L. Barber, treasurer	LaSalle County Institute	5	75 00
873	Conrad Kolmer, treasurer	Monroe County Institute	5	75 00
874	M. O. Wilderman, treasurer	St. Clair County Institute	5	75 00
875	Wm. Grattendick, treasurer	Washington County Institute	5	75 00
876	F. Dressor, treasurer	Bond County Institute	5	45 50
877	J. A. Shanklin, treasurer	Marshall County Institute	5	58 57
878	Fred Kirkland, treasurer	Henry County Institute	5	75 00
879	H. G. Easterly, treasurer	Williamson County Institute	5	42 41

Approved Jan. 30, 1908.

Financial Statement—Continued.

Warrant number.	To Whom.	For What.	Fund number.	Amount.
880	Adams Express Co	Express charges	1	$ 17 87
881	American Express Co	..do	1	42 69
882	United States Express Co	..do	1	14 91
883	M. K. Weems & Co	Toilet supply	1	60
884	W. H. Cox	Gravel Spring water	1	1 50
885	St. Louis Button Co	Badges, state meeting	1	7 15
886	H. A. McKeene	Cash advanced for postage, etc	1	23 35
887	Frank H. Hall	Salary for month of January	4	214 28
888	Joseph Carter	Services as lecturer in nine counties	4	90 00
889	Mrs. I. S. Raymond	Expenses I. A. D. S	7	9 52
890	Mrs. Gustave Klarner	..do	7	13 63
891	St. Louis Button Co	Badges for I. A. D. S. Meeting	7	25 75
892	P. M. Rindesbacher, treasurer	JoDaviess County Institute	5	75 00
893	M. A. Crawford, treasurer	Lee County Institute	5	75 00
894	C. W. Mitchell, treasurer	Whiteside County Institute	5	75 00
895	Samuel Dewees, treasurer	Kankakee County Institute	5	75 00
896	John W. Vent, treasurer	Piatt County Institute	5	67 10
897	Frank Houser, treasurer	DeWitt County Institute	5	75 00
898	E. A. Moyer, treasurer	Douglas County Institute	5	63 24
899	Rich. J. Dickinson, treasurer	Woodford County Institute	5	75 00
900	N. E. Fulton, treasurer	Livingston County Institute	5	75 00
901	D. A. Taylor, treasurer	Ford County Institute	5	72 65

Approved Feb. 12, 1908.

Warrant number.	To Whom.	For What.	Fund number.	Amount.
903	Margaret M. Romine	Services and expenses	4	$ 30 55
904	Mrs. Blanche Grier	Three days reporting	4	30 00
905	Margaret M. Romine	Balance on hotel bill	4	1 25
906	Schnepp & Barnes	Programs, cards, badges	4	28 50
907	Granville Creators	Six days services packing reports	1	9 00
908	J. B. Burrows	Expenses as director	4	43 95
909	James Frake	..do	4	14 00
910	A. W. Miner	..do	4	14 06
911	A. V. Schermerhorn	Expenses acting director	4	17 20
912	Edward Grimes	Expenses as director	4	18 03
913	J. F. McCartney	..do	4	23 46
914	Chas. W. Farr	..do	4	16 25
915	A. J. Bill	Services and expenses (press)	4	128 42
916	H. A. McKeene	Expenses as secretary	4	25 75
917	Nellie Schermerhorn	Expenses registration commissioner	4	20 61
918	Chester F. Barnett	Reporting section work	4	31 85
919	Dick Townsend	Boarding reporters	4	13 25
920	A. G. Bartholomew	Furnishing two cows two days	4	8 00
921	Chas. S. Burdick	..do	4	8 00
922	Fred R. Crane	Expenses as speaker	4	14 39
923	W. C. Coffey	..do	4	28 51
924	R. B. Howe	Expenses operating stereopticon	4	16 81
925	C. D. Smith	Expenses as speaker	4	15 92
926	L. D. Hall	..do	4	5 21
927	Wm. Dietrich	..do	4	4 34
928	Joseph Carter	..do	4	10 61
929	R. C. Obrecht	..do	4	6 76
930	Mrs. Joseph Carter	Expenses I. A. D. S	7	10 61
931	Miss Charlotte Gibbs	..do	7	11 96
932	Mrs. W. H. Browne	..do	7	7 50
933	Miss Eva R. Robinson	..do	7	27 46
934	E. W. Burroughs	Expenses as director	4	58 55
935	H. G. Kauffman, treasurer	Ogle County Institute	5	75 00
936	F. C. Wells, treasurer	McHenry County Institute	5	75 00
937	Peter Hoy, treasurer	DuPage County Institute	5	75 00
938	Wilbur Francis, treasurer	Will County Institute	5	75 00
939	T. L. Hudson, treasurer	Moultrie County Institute	5	75 00
940	Z. R. Genung, treasurer	Champaign County Institute	5	75 00
941	John Simpson, treasurer	Carroll County Institute	5	75 00
942	Frank E. Culp, treasurer	Madison County Institute	5	75 00

Approved Feb. 24, 1908.

Financial Statement—Continued.

Warrant number...	To Whom.	For What.	Fund number...	Amount.
943	Elizabeth Goldstein	Salary for February	1	$83 33
944	F. E. Cramer, for T. W. Co	Tabulator and type	1	10 00
945	L. H. Smith	Expenses on account of State meeting	4	43 32
946	W. T. Craig	..do	4	16 26
947	L. A. Hunter	..do	4	8 66
948	Albert N. Hume	..do	4	7 19
949	Dr. C. G. Hopkins	..do	4	13 01
950	John M. Houseman	Expenses as director	4	14 00
951	Mrs. I. S. Raymond	Expenses on account of I. A. D. S	7	20 36
952	Mrs. Jennie C. Barlow	..do	7	32 86
953	Guy Phillips, treasurer	Kane County Institute	5	75 00
954	Roy W. Burritt, treasurer	Winnebago County Institute	5	75 00
955	Edward Schneider, treasurer	Hardin County Institute	5	20 72
956	Rebecca Davis	Registration Committee	4	26 83
957	Aaron W. Miner	Expenses as director	4	7 85

Approved Feb. 25, 1908.

Warrant number...	To Whom.	For What.	Fund number...	Amount.
958	American Express Co	Express charges	1	$54 75
959	Adams Express Co	..do	1	43 43
960	Pacific Express Co	..do	1	20 06
961	Western Union Tel. Co	Messages	1	1 99
962	W. H. Cox	Water supply	1	1 50
963	H. A. McKeene	Postage, mailing bulletins	1	20 00
964	Wm. Hawley Smith	Services as speaker	4	50 00
965	John W. Cook	Expenses on account of State meeting	4	10 00
966	J. W. Fraser	..do	4	11 26
967	C. E. Lee	..do	4	11 56
968	H. H. Gross	..do	4	11 00
969	C. C. Hayden	..do	4	13 26
970	John W. Lloyd	..do	4	7 31
971	David Kinley	..do	4	6 71
972	Frank I. Mann	Expenses as director	4	64 57
973	R. W. Chittenden	..do	4	30 50
974	A. N. Abbott	..do	4	50 01
975	S. N. Black	..do	4	7 56
976	H. G. Easterly	..do	4	39 50
977	Geo. W. Dean	..do	4	5 90
978	James Frake	..do	4	13 40
980	Chas. W. Farr	..do	4	13 32
981	J. L. McCartney	..do	4	14 48
982	R. O. Graham	..do	4	3 41
983	M. K. Sweet	..do	4	13 35
984	Edward Grimes	..do	4	7 99
985	Frank H. Hall	Salary and expenses as superintendent	4	310 88
986	Joseph Carter	Services at two institutes	4	20 00
987	Geo. R. Lowden	Expenses as delegate Dist. Conf	4	1 70

Approved March 6, 1908.

Financial Statement—Continued.

Warrant number.	To Whom.	For What.	Fund number.	Amount.
988	The Pantagraph Co.	343 copies, three weeks	4	$ 30 87
989	C. R. Gibson	Four 8x10 negatives	4	6 00
990	Chas. P. Watson	Reporting domestic science sessions	7	106 00
991	United States Express Co.	Express charges	1	53 02
992	J. P. Winsor, treasurer	Grundy County Institute	5	75 00
993	E. E. McCoy, treasurer	Brown County Institute	5	21 05

Approved March 6, 1908.

Warrant number.	To Whom.	For What.	Fund number.	Amount.
994	Inter-State Tel. & Tel. Co	Telephone service	1	$12 75
995	George W. Smith	25 copies "Student's History"	3	25 00
996	Mrs. Blanche Grier	145 pages transcript	4	50 75
997	Theo. S. McCoy	Services and transcript	4	27 20
998	J. Otis Humphrey	Expenses as speaker	4	7 80
999	J. W. Folsom	..do.	4	6 56
1000	S. B. Mason	Expenses as director	4	22 36
1001	J. J. Southworth, treasurer	Vermilion County Institute	5	75 00

Appoved 18, 1908.

Warrant number.	To Whom.	For What.	Fund number.	Amount.
1002	Elizabeth Goldstein	Salary for March	1	$83 33
1003	H. A. McKeene	Cash for postage	1	10 00
1004	M. K. Weems & Co.	Towel supply	1	60
1005	J. P. Mason	Expenses as director	4	37 43
1006	James McNabb, treasurer	Greene County Institute	5	75 00
1007	Chas. H. Blakeway, treasurer.	Stephenson County Institute	5	62 36
1008	Jennie C. Barlow	Services and expenses acc't I. A. D. S.	7	17 80
1009	George Woodall, treasurer	Scott County Institute	5	75 00

Approved April 3, 1908.

Financial Statement—Continued.

Warrant number.	To Whom.	For What.	Fund number.	Amount.
1010	Adams Express Co	Express charges	1	$ 3 80
1011	American Express Co	..do	1	8 32
1012	U. S. Express Co	..do	1	3 84
1013	Pacific Express Co	..do	1	1 77
1014	W. H. Cox	Water supply	1	1 50
1015	H. A. McKeene	Cash for postage	1	10 00
1016	Frank H. Hall, superintendent	Salary and expenses	4	219 40
1017	Arthur J. Bill	Services (press bureau)	4	56 17
1018	Mrs. Blanche Grier	94 pages transcript	4	32 90
1019	A. N. Abbott	Expenses as director	4	1 95
1020	Edward Grimes	..do	4	7 44
1021	A. V. Schermerhorn	..do	4	9 19
1022	J. H. Martin	Expenses, account 13th District Conf	4	1 95
1023	R. F. Dameier	..do	4	4 00
1024	Theo. F. Ellis	..do	4	4 24
1025	Ira W. Marshall	..do	4	2 30
1026	B. F. Hoover	..do	4	2 09
1027	W. G. Curtis	..do	4	5 90
1028	E. C. Steshem	..do	4	3 15
1029	Abram Ackert	..do	4	75
1030	W. R. Hostetter	..do	4	5 38
1031	R. W. King	..do	4	1 89
1032	C. C. Pervier	Expenses, account 16th District Conf	4	2 95
1033	Peter Sweitzer	..do	4	1 15
1034	M. O. Scott	..do	4	3 79
1035	Henry Nowlan	..do	4	2 28
1036	J. L. Schwartzenstraub	..do	4	1 15
1037	Mrs. Henry Nowlan	..do	4	2 28
1038	Andrew P. Hughes	Expenses, account 21st District Conf	4	2 95
1039	W. E. Holben	..do	4	4 25
1040	C. E. Mitchell	Expenses, account 23d District Conf	4	4 92
1041	Joseph Danks	..do	4	2 85
1042	F. C. Seiler	..do	4	2 90
1043	Claude H. Cox	..do	4	5 24
1044	Joseph Oldfield	..do	4	5 24
1045	Lewis F. Taylor	..do	4	3 48
1046	Ed. Phillips	..do	4	50
1047	J. H. Haltgrave	..do	4	3 66
1048	G. W. Corbin	..do	4	2 26
1049	O. L. Wakefield	..do	4	3 48
1050	Jerry Dunn	..do	4	2 00
1051	Arthur L. Jaques	..do	4	3 08
1052	J. F. McCartney	Total expense of 24th District Conf	4	160 14
1053	H. E. Starkey	Expense account, 17th District Conf	4	1 50
1054	S. J. Woland	..do	4	1 50
1055	Omar P. Wagner	..do	4	2 40
1056	G. K. Elder	..do	4	2 50
1057	V. G. Way	..do	4	2 31
1058	W. F. Mo tier	..do	4	2 15
1059	James W. Mitchell	..do	4	1 00
1060	J. J. Southworth	Expense account, 18th District Conf	4	4 80
1061	Alden Snyder	..do	4	1 00
1062	J. J. Meehling	..do	4	5 95
1063	J. H. Maurer	..do	4	5 95
1064	C. D. Smith	..do	4	5 05
1065	Thos. Clifton	..do	4	4 78
1066	Thos. A. Taylor	..do	4	1 90
1067	W. W. Rothgeb	..do	4	4 35
1068	Geo. W. Brown	..do	4	4 65

Approved April 13, 1908.

Financial Statement—Continued.

Warrant number...	To Whom.	For What.	Fund number...	Amount.
1069	Schnepp & Barnes	Conference circular annnoucements, letter heads, etc	1	$14 25
1070	Elizabeth Goldstein	Salary for April	1	83 33
1071	J. P. Mason	Expenses as director	4	2 25
1072	R. T. Morgan	Expenses on account of 11th Dist. Conf..	4	1 50
1073	Frank Sprague	..do	4	2 04
1074	Dwight Milne	..do	4	2 04
1075	Wm. Hammerschmidt	..do	4	1 50
1076	J. F. Westphall	..do	4	3 00
1067	B. L. Thomas	..do	4	3 25
1078	H. G. Harvey	..do	4	2 39
1079	Chas. A. Deuel	Expenses on account of 13th Dist. Conf..	4	4 69
1080	A. W. Miner	Expenses as director, 14th Disrict	4	2 87
1081	Wm. H. Ashdown	Expenses on account of 14th Dist. Conf..	4	4 50
1082	C. T. Spicer	..do	4	2 18
1083	M. P. Berry	..do	4	3 96
1084	J. E. Williams	..do	4	3 96
1085	Fred Carrison	..do	4	2 87
1086	L. B. Strager	..do	4	4 70
1087	Thos. T. McClanahan	..do	4	1 20
1088	S. N. Black	Expenses as director, 15th District	4	4 38
1089	E. S. Dean	Expenses on account of 15th Dist. Conf..	4	1 42
1090	J. W. Morgan	..do	4	1 42
1091	J. E. Simmonds	..do	4	3 72
1092	John W. Head	..do	4	90
1063	J. B. Frisbie	..do	4	5 00
1094	Clyde E. Brown	..do	4	3 56
1095	J. W. Whitson	..do	4	3 56
1096	F. W. Scanlan	..do	4	1 00
1097	E. H. Diehl	..do	4	4 56
1098	W. H. Bissel	..do	4	1 62
1099	T. H. Castle	..do	4	90
1100	S. M. Snyder	Expenses on account of 17th Dist. Conf..	4	5 73
1101	W. H. Catey	Expenses on account of 18th Dist. Conf..	4	4 82
1102	W. H. McFadden	..do	4	4 82
1103	J. B. Burrows	Expenses as director, 19th District	4	7 20
1104	Roscoe Farrar	Expenses on account of 19th Dist. Conf..	4	2 30
1105	Harvey N. Ames	..do	4	2 30
1106	E. L. Hoffman	..do	4	2 14
1107	Clauude Thorp	..do	4	2 34
1108	C. S. Lyles	..do	4	2 70
1109	E. W. Green	..do	4	3 00
1110	C. M. Weller	..do	4	3 50
1111	J. C. Hoke	..do	4	4 08
1112	Tobias Rhodes	..do	4	4 08
1113	I. S. Raymond	..do	4	2 75
1114	J. A. Hossack	..do	4	50
1115	W. W. Royer	..do	4	1 10
1116	L. W. Wise	..do	4	1 45
1117	E. F. Karls	..do	4	5 32
1118	W. E. Killam	..do	4	5 32
1119	D. E. Brett	..do	4	1 95
1120	Frank B. Sawyer	..do	4	2 50
1121	T. T. Smith	Expenses on account of 21st Dist. Conf...	4	2 91
1122	W. J. H. Fahrenkrog	..do	4	3 10
1123	S. R. Winchester	..do	4	2 85
1124	W. H. Leckrone	Expenses when director	4	4 30
1125	Chas. T. McLaughlin	Expenses on account of 23d Dist. Conf...	4	3 42
1126	T. J. Hoatlaw	..do	4	5 26
1127	H. B. Wham	..do	4	2 66
1128	W. E. Finley	..do	4	1 22
1129	S. T. Maxcy	..do	4	5 51
1130	W. H. Hill, treasurer	Boone County Institute	4	75 00

Approved April 25, 1908.

Financial Statement—Continued.

Warrant number...	To Whom.	For Wh	Fund number...	Amount.
1131	Adams Express Co.	Express charges	1	$ 2 05
1132	American æxpress Co.	..do.	1	7 65
1133	U. S. Express Co.	..do.	1	1 50
1134	Western Union Tel. Co.	Messages	1	1 80
1135	Coe Brothers	Neostyle supplies	1	90
1136	W. H. Cox	Water supply	1	2 00
1137	M. K. Weems & Co	Towel supply	1	60
1138	H. A. McKeene	Cash for postage	1	10 00
1139	World's Scrap Book Co.	One filing book	3	2 50
1140	B. F. Wyman	Expenses as director	4	5 02
1141	W. H. Hill	Expenses on account of 12th Dist. Conf.	4	3 82
1142	C. H. Fellingham	..do.	4	4 00
1154	Mrs. C. H. Fellingham	..do.	4	4 00
1143	J. V. Jessup	..do.	4	2 45
1144	A. C. Gabel	..do.	4	2 65
1145	Frank Johns	..do.	4	4 30
1146	S. E. Aoisington	..do.	4	4 10
1147	Frank Funk	..do.	4	4 25
1148	C. M. Pool	..do.	4	4 25
1149	G. F. Soger	..do.	4	3 82
1150	H. H. Parke	..do.	4	3 00
1151	H. O. Whitmore	..do.	4	2 86
1152	A. P. Grout	Expenses as director and for Dist. Conf.	4	129 23
1153	Mrs. Jennie C. Barlow	Services and expenses, I. A. D. S.	7	18 55

Approved May 8, 1908.

Warrant number...	To Whom.	For What.	Fund number...	Amount.
1155	Springfield Canvas Goods Co.	Storing and hanging awning	1	$ 1 00
1156	O. Hanratty	Repairing plumbing	1	2 80
1157	Elizabeth Goldstein	Salary for May, 1908	1	83 33
1158	H. A. McKeene.	Committee expense and postage	1	25 31
1159	A. V. Schermerhorn	Expenses as director	4	21 80
1160	Edward Grimes	..do.	4	18 92
1161	E. Burroughs	..do	4	35 71
1162	Louis Huseman	Expenses on account of 22d Dist. Conf.	4	2 50
1163	Jas. R. Hood	..do.	4	3 20
1164	Mahlon Hartman	..do.	4	75
1165	Herm Mueller	..do.	4	3 30
1166	Chas. Lexlow	..do.	4	1 30
1167	F. Baumberger	..do.	4	4 00
1168	E. E. Mitchell	..do.	4	4 22
1160	Joel Williams	..do.	4	1 80
1170	A. J. Bill	Services on account of press bureau	4	27 17
1171	Blanche Grier	181 pages transcript	4	63 35
1172	Mrs. H. A. McKeene	Expense acct. dept. household science	7	15 31
1173	Mrs. J. M. Aikman	..do.	7	3 40
1174	Mrs. Jennie C Barlow	Services and expenses	7	19 15

Approved June 1, 1908.

Financial Statement—Concluded.

Warrant number.	To Whom.	For What.	Fund number.	Amount.
1175	American Express Co	Express charges	1	$ 15 40
1176	Adams Express Co	..do	1	5 76
1177	Pacific Express Co	..do	1	2 89
1178	U. S. Express Co	..do	1	4 40
1179	Inter-State I. T. &. T. Co	Telephone service	1	9 35
1180	John Underfanger	Freight and drayage	1	9 87
1181	W. H. Cox	Water supply	1	2 00
1182	Granville Creators	Boxes and packing	1	6 00
1183	H. A. McKeene	Cash for postage (press arts)	1	15 00
1184	Frank H. Hall	Salary and expenses	1	299 53
1185	A. V. Schermerhorn	Expenses as director	4	5 45

Approved June 15, 1908.

The following exhibit shows the amount remaining to the credit of the several funds on the books of the secretary, June 30, 1908.

Fund No. 1, Office expenses, postage, etc	$549 81
Fund No. 3, Libraries	451 46
Fund No. 4, General expenses	58 36
Fund No. 7, Department of household science	68 41
Total	$1,128 05

Reports of County Institutes, 1907-8.

County.	No. days	No. sessions....	Attendance	Total cost.......	State paid	County boards.
Adams	4	10	....	$ 75 65	$75 00	....
Alexander	3	6	....	74 38	74 38	....
Bond	2	5	865	79 00	75 00	$100 00
Boone	5	8	2,000	165 02	75 00	....
Brown	2	6	1,023	35 00	35 00	....
Bureau	2	5	1,840	275 00	75 00	50 00
Calhoun	2	3	25	65 00	65 00	....
Carroll	2	5	1,075	77 28	75 00	....
Cass	2	6	500	130 00	75 00	....
Champaign	2	5	910	117 50	75 00	....
Christian	3	8	3,460	550 21	75 00	....
Clark	2	5	350	73 00	75 00	....
Clay	3	8	888	210 00	75 00	....
Clinton	2	5	250	56 30	56 30	....
Coles	3	7	1,090	75 00	75 00	....
Cook	7	8	750	117 90	75 00	....
Crawford	3	8	392	75 00	75 00	....
Cumberland	2	4	1,400	43 12	43 12	100 00
DeKalb	3	7	3,000	600 00	75 00	150 00
DeWitt	3	7	800	108 52	75 00	....
Douglas	3	7	1,165	90 74	63 24	....
DuPage	2	7	800	450 75	75 00	340 00
Edgar	2	6	2,850	186 06	75 00	50 00
Edwards	2	5	1,500	97 03	72 39	....
Effingham	3	6	300	176 05	75 00	100 00
Fayette	2	6	1,000	289 18	75 00	50 00
Ford	2	6	1,306	72 65	72 65	50 00
Franklin	2	5	109	58 28	58 28	....
Fulton	2	5	204	95 13	75 00	100 00
Gallatin	3	6	887	273 50	75 00	100 00
Greene	4	6	1,350	75 00	75 00	....
Grundy	2	5	600	77 10	75 00	....
Hamilton	3	9	3,000	213 40	75 00	....
Hancock	2	5	940	128 56	63 75	....
Hardin	2	5	250	62 00	54 28	....
Henderson	No re	port..	....	....	....	....
Henry	3	7	1,200	280 00	75 00	75 00
Iroquois	3	7	4,100	300 00	75 00	100 00
Jackson	3	4	500	63 76	63 76	....
Jasper	2	5	1,000	120 00	71 20	50 00
Jefferson	3	8	400	200 00	75 00	....
Jersey	2	5	1,200	150 00	75 00	100 00
Jo Daviess........................	3	6	1,200	....	75 00	....
Johnson	3	7	200	75 00	75 00	....
Kane	3	7	3,000	250 00	75 00	100 00
Kankakee	3	6	350	175 00	75 00	75 00
Kendall	2	6	1,550	132 28	75 00	....
Knox	2	6	1,500	61 02	61 02	....
Lake	No re	port..	....	....	....	....
LaSalle	2	5	1,675	88 15	75 00	....
Lawrence	3	7	1,500	73 25	73 25	....
Lee	3	9	1,600	182 37	75 00	100 00
Livingston	2	5	1,200	207 84	75 00	....
Logan	3	8	3,000	500 00	75 00	150 00
McDonough	2	4	190	82 50	74 50	50 00
McHenry	2	5	500	93 75	75 00	....
McLean	3	8	2,530	111 53	75 00	50 00
Macon	4	10	2,000	79 20	75 00	....
Macoupin	3	8	4,350	350 00	75 00	100 00
Madison	3	7	3,000	675 00	75 00	100 00
Marion	3	8	2,300	186 00	75 00	....
Marshall	2	4	535	115 00	75 00	....
Mason	3	8	2,500	374 85	75 00	100 00
Massac	3	6	750	150 19	74 99	....
Menard	No re	port..	....	....	....	....
Mercer	2	6	280	48 33	48 33	....

Reports of County Institutes—Concluded.

County.	No. days.	No. sessions.	Attendance.	Total cost.	State paid.	County boards.
Monroe	2	2	578	$134 25	....	....
Montgomery	3	8	650	231 75	$75 00	$ 75 00
Morgan	2	5	500	48 75	48 75	....
Moultrie	4	5	900	75 00	75 00	....
Ogle	3	6	2,150	275 00	75 00	100 00
Peoria	2	6	300	175 06	75 00	....
Perry	2	5	....	....	75 00	....
Piatt	2	5	600	158 10	75 00	....
Pike	2	4	700	44 00	44 00	....
Pope	3	6	3,700	232 85	75 00	....
Pulaski	2	5	300	29 85	29 85	....
Putnam	2	4	230	40 05	40 05	....
Randolph	4	8	900	113 85	75 00	....
Rock Island	2	6	1,600	59 62	75 00	....
Richland	3	8	3,300	313 22	75 00	50 00
Saline	2	4	100	53 05	53 05	....
Sangamon	3	9	3,135	315 83	75 00	300 00
Schuyler	2	5	500	77 50	47 50	25 00
Scott	3	6	1,300	150 00	75 00	....
Shelby	2	5	180	52 75	52 75	....
Stark	2	6	300	70 90	49 97	....
St. Clair	2	5	1,200	300 00	75 00	50 00
Stephenson	2	6	1,400	75 36	75 00	....
Tazewell	3	9	1,000	336 11	75 00	100 00
Union	2	6	....	30 40	30 40	....
Vermilion	3	6	1,400	....	75 00	....
Wabash	3	8	1,900	184 61	75 00	....
Warren	2	6	295	73 69	73 69	....
Washington	2	4	400	75 65	75 00	....
Wayne	4	10	500	61 11	61 11	50 00
White	2	5	....	138 00	33 00	....
Whiteside	2	5	1,625	464 35	75 00	....
Will	2	6	6,000	300 00	75 00	....
Williamson	2	4	....	42 42	42 41	....
Winnebago	6	12	1,780	537 08	75 00	200 00
Woodford	6	16	1,895	342 00	75 00	150 00

SUMMARY.

Institute Season Opened August 20, 1907, and Closed May 26, 1908.

Number of days in which institutes were held	260
Number of sessions	627
Reported attendance (total)	122,523
Reported expenditures (total)	$16,170 03
Of this amount the State paid	6,736 43
Appropriated by county boards	3,540 00

Publications Issued During the Year.

Twenty thousand copies annual report, Vol. 12.
Seven thousand copies Bulletin No. 9.
Ten thousand copies Bulletin No. 10.
Forty thousand copies Report of Committee on Soil Investigations.
Five thousand copies Bulletin No. 11.
Sixty-two press articles containing a total of 50,659 words.

Respectfully submitted,

H. A. MCKEENE,
Secretary.

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